STEEL

The

Metalworking Weekly

NOVEMBER 21, 1960

A PENTON PUBLICATION

36% of Metalworking Plants Plan Capacity Expansions in 1961

Where Forging Research Is Needed

Automakers Seek Galvanized Sheet That's Coated on One Side Only

How to Pick the Right Lubricant

Knowing the right lubricant can save dollars in your drawing and forming costs. New additives and lubricating techniques are making possible forming operations that couldn't be done ten years ago. An experienced metallurgist discusses lubricating agents from oils to duplex coatings. There's a checklist to help you pick the best lubricant for your specific forming job. See Page 98.

MATERIALS EFFICIENCY

Put a Pro in Purchasing

No. 24 in STEEL's Program for Management

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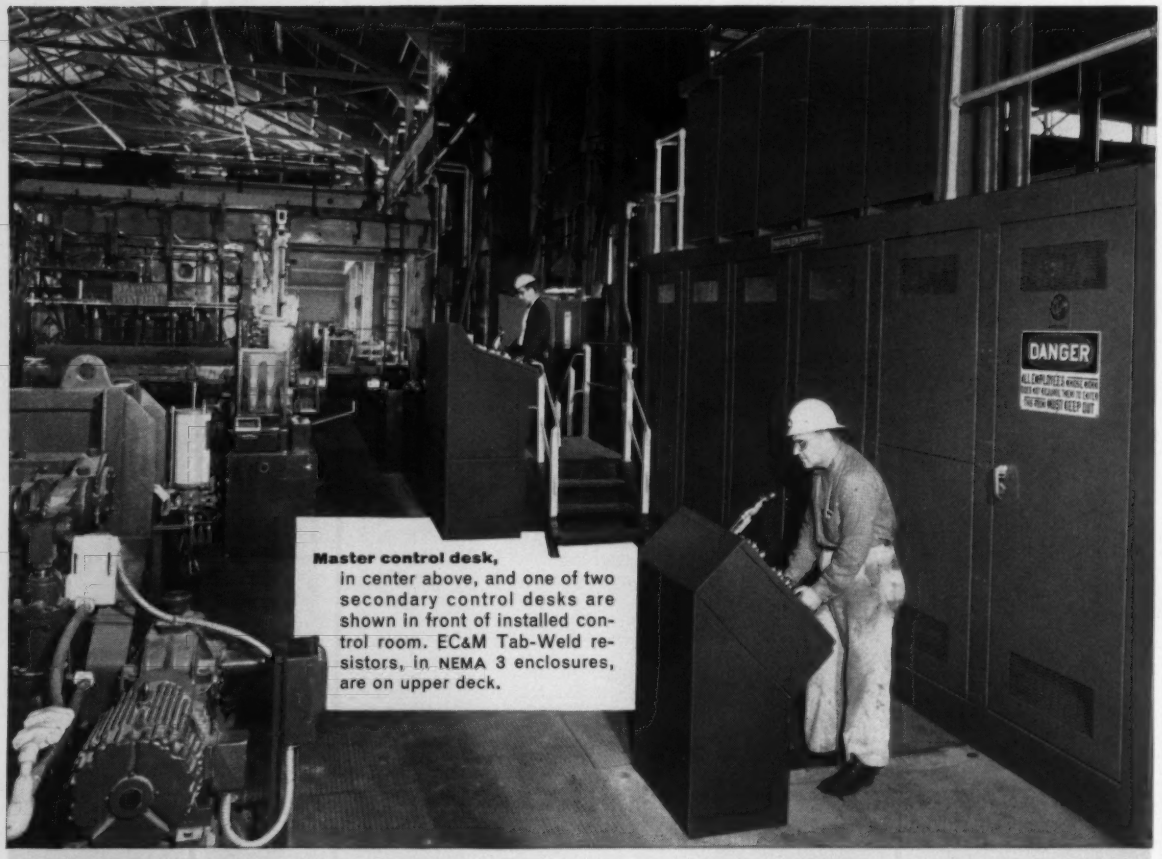


Master control desk, in center above, and one of two secondary control desks are shown in front of installed control room. EC&M Tab-Weld resistors, in NEMA 3 enclosures, are on upper deck.

14-ton Mill-Line Control Room cuts installation time IN HALF!..

Ready for shipment after final test at EC&M plant.

Interior view shows DC main drive contactors at left and motor control centers at right. Framework is of heavy structural design, with 4-way safety pattern deck plates.

• This giant control room, built by EC&M for a coil welding line in a major steel mill, was installed and ready for operation in half the time usually required. Completely pre-wired and interconnected, the packaged unit eliminated the four to five weeks of installation time normally required for wiring and testing. At the mill site, the control room was placed over an open pit which already contained power cables and control wiring.

The control room measures 8 feet wide, 21 feet long and 14 feet high. It contains all the control panels for operating the DC main drives, AC auxiliary drives, and for supplying low voltage DC power for jogging and threading.

For any mill drive, EC&M can design and build a control room which will save space, drastically cut installation time and trouble, and get your drive in operation faster.

Write for details • *Square D Company, EC&M Division, 4500 Lee Road, Cleveland 28, Ohio*

SQUARE D COMPANY

EC&M DIVISION • CLEVELAND 28, OHIO

wherever electricity is distributed and controlled

5484

This Week in STEEL

The Metalworking Weekly

November 21, 1960 Vol. 147 No. 21

36.5% of Metalworking Plants Plan '61 Expansions

14.8% Will Build New Plants

26.6% Will Build New Additions

57.5% Will Buy New Equipment

PAGE 55

Atlantic Research Thrives on Government Business

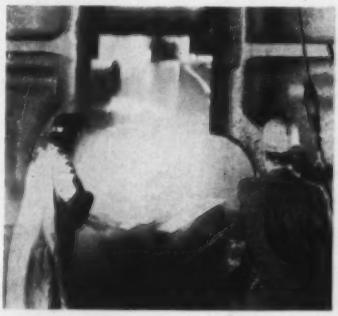
Headed by Dr. Arch C. Scurlock, Atlantic Research Corp. has pushed its sales from $44,657 in 1949 to an estimated $13 million this year. Its forte: Solid rocketry, electronics, plastics. Dr. Scurlock is confident about his company's future because "we're in a field where competition is between people, not on a price basis." Friends and competitors alike credit him with a real flair for buying small firms and molding them to fit his firm's business pattern. For a closer look at this young president's mode of management, see PAGE 58

Materials Efficiency—Put a Pro in Purchasing

Purchasing professionalism has many requirements. Three stand out: Need for more knowledge, greater use of professional tools, higher ethical standards. Previous articles have dealt with knowledge and tools. This one examines the third element—ethics. PAGE 65

Expert Cites Forging Research Needs

To meet the threats of foreign competition and other processes, the forging industry must do research in five areas, believes Harry B. Goodwin, Battelle Memorial Institute consultant. The areas: Fundamentals of metal flow; distribution of forging energy; methods of operation; protective coatings, inert atmospheres; improved heating, higher forging temperatures. What pressures are behind those needs? See PAGE 102



Automakers Boost Use of Galvanized

Advent of the compacts, with the unit bodies, has increased the steelmakers' market for galvanized sheets. But high on many auto and steel officials' lists of "most wanted" materials in their drive to fight corrosion in cars is a sheet that is galvanized on one side only, is free of scratches and other surface defects on the other side. That would indeed open up a vast new market for galvanized steel. PAGE 133

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KNOW YOUR ALLOY STEELS . . .

This is one of a series of advertisements dealing with basic facts about alloy steels. Though much of the information is elementary, we believe it will be of interest to many who may find it useful to review fundamentals from time to time.

Methods of Carburizing Alloy Steels

Carburizing is a means of impregnating the surface of steel with carbon, usually to very limited depths. Its purpose is to provide a hard, wear-resisting "case," or outer shell. Alloy steels, correctly handled, can be case-hardened without sacrificing desirable core properties.

There are three types of carburizing in general use:

Liquid Carburizing—The medium here is a hot-salt bath composed basically of cyanide compounds. The steel is immersed in the bath, the period of immersion depending upon the analysis of the steel and the depth of case desired. Liquid carburizing is a convenient method of producing thin, hard, wear-resisting cases, generally within the depth range of 0.02 to 0.03 in. However, deeper cases may be obtained, the actual depths depending upon economics and end uses.

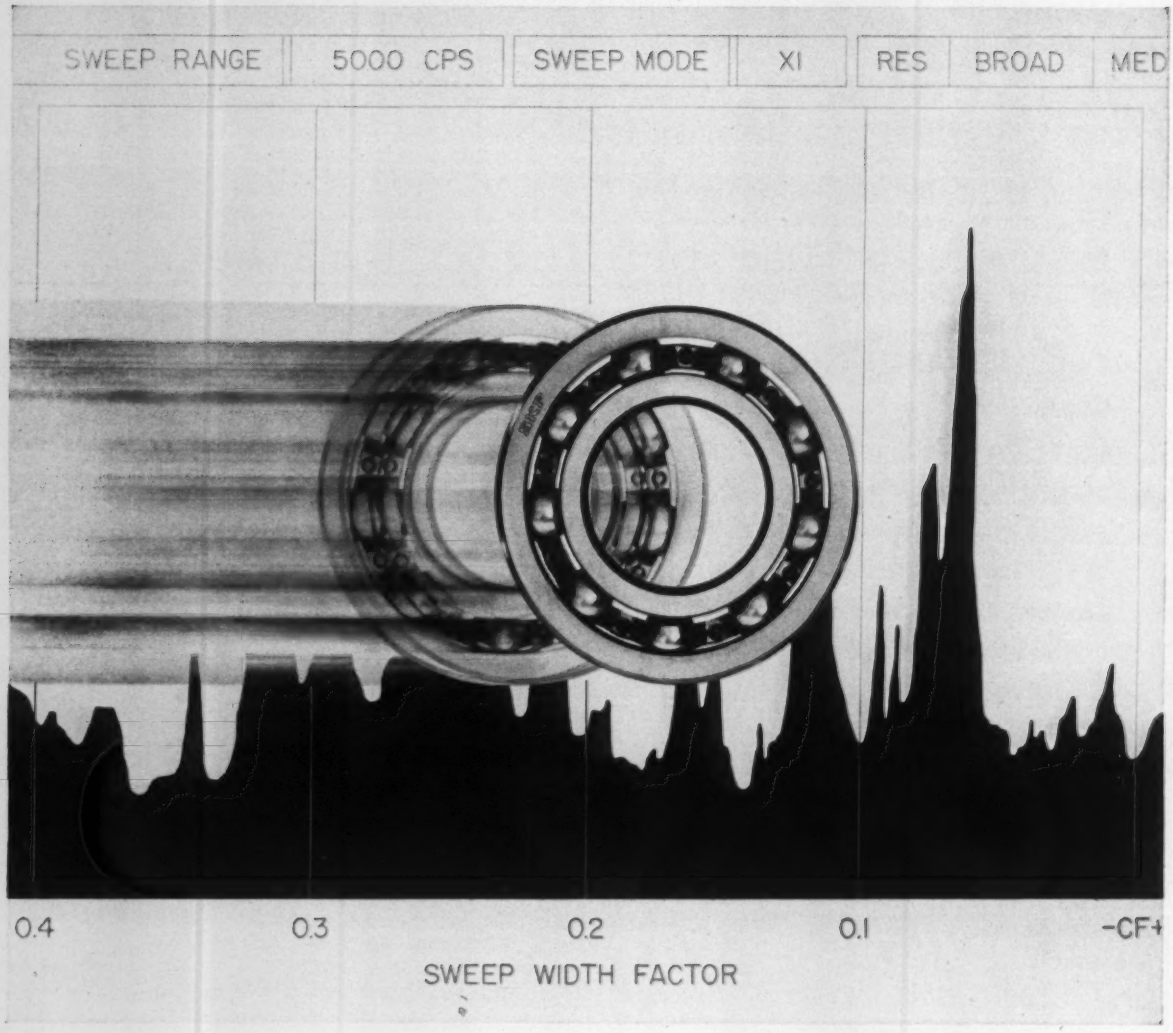
Gas Carburizing — This method employs a furnace in which a carbonaceous atmosphere is created; i.e., gases that are high in carbon components, or those containing carbon. Steel subjected to gas carburizing can be case-hardened to depths generally ranging from 0.01 to 0.04 in. When quenching takes place immediately after carburizing, distortion can be kept to a minimum.

Pack Carburizing — Where the pack method is used, the parts to be carburized are buried in a container of dry carbonaceous materials. The container is sealed tight to prevent the infiltration of air, placed in a furnace and kept there for eight hours or more, the actual time depending upon the depth of case desired. Pack carburizing is particularly suitable where a deep case is essential (0.06 in. and over), although medium cases in the 0.04-to-0.06-in. range are possible.

This series of alloy steel advertisements is now available as a compact booklet, "Quick Facts about Alloy Steels." If you would like a free copy, please address your request to Publications Department, Bethlehem Steel Company, Bethlehem, Pa.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Sales: Bethlehem Steel Export Corporation

BETHLEHEM STEEL



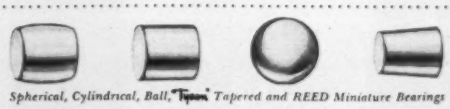
Now, SKF reduces the noise level of ball bearings by 50%!

New SKF ball bearings run twice as quietly as standard single-row deep-groove bearings – six times more quietly than bearings produced just two years ago.

They're designed especially for applications where noise is an important factor. Eight manufacturers, who use-tested them for over a year, now back-up their approvals with repeat orders.

Every bearing meets new, more critical standards. Each type and size meets special requirements for reduced vibration. Every ball meets very low waviness limits. Each cage meets critical standards for smooth, quiet performance.

SKF will make a comparison check of these improved bearings against the bearings you're now using. See for yourself! Just call the SKF branch office nearest you. 6013



Spherical, Cylindrical, Ball, Tapon, Tapered and REED Miniature Bearings

EVERY TYPE—EVERY USE

SKF®

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.

*REG. U.S. PAT. OFF.

ONLY DRACCO CAN OFFER

sonic cleaning

(patented)

the most modern and efficient method for removing dust from cloth-bag dust collectors

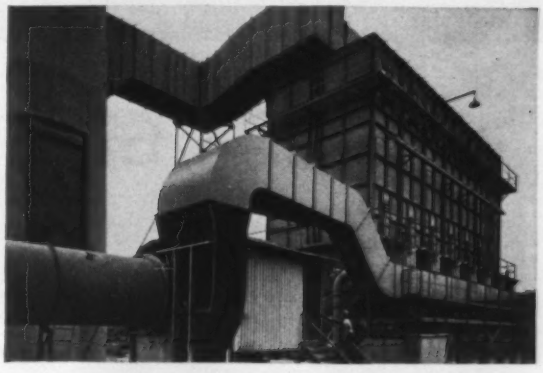
Dracco dust collectors now utilize one of industry's most exciting new techniques — *sonics* — to realize greatly improved filter bag cleaning action. This development is so significant that you should not specify or buy another dust control unit until you get the full story on sonic cleaning.

Sonic cleaning — patented and available exclusively from Dracco — provides three operating advantages: *lower back pressure* through effective dust removal; *longer bag life* since bags are not flexed, creased or shaken; *lower maintenance* through elimination of moving parts within the collector.

Cleaning by low-frequency sound waves has been conclusively proved in full-scale field operations on both Glass-Bag Filters and on conventional baghouses using cotton and synthetic bags.

Sonic cleaning is recommended for cement mill applications (kilns, grinding, classifying, materials handling), electric and open hearth steel furnaces, metallurgical furnaces, rock dryers, calciners, fusing furnaces, chemical processes and related applications. You can use it wherever mechanical shaking is undesirable or unsuitable and eliminate the shakers.

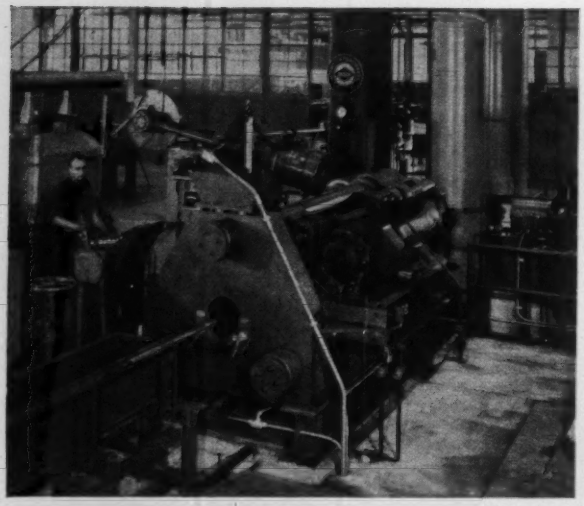
You can get further information on Dracco sonic cleaning and expert consultation on your dust control requirements from: Dracco Division of Fuller Co., Harvard Avenue & East 116th Street, Cleveland 5, Ohio.

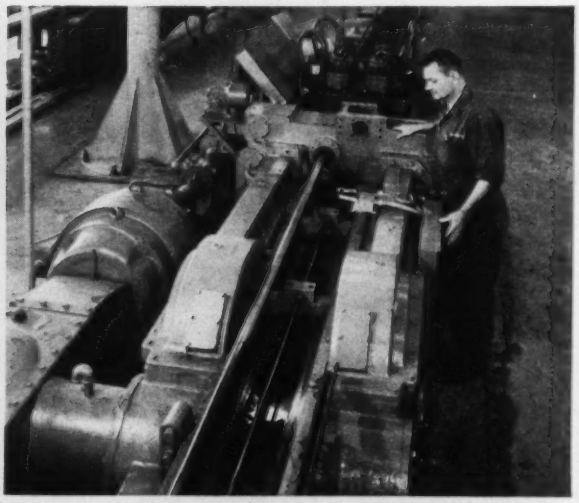


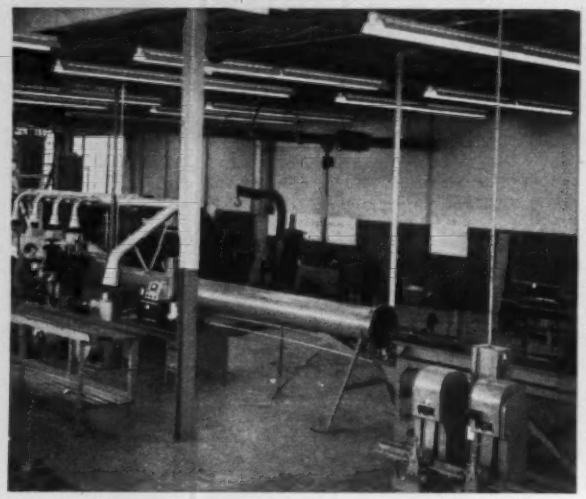
Proved in service — Dracco Glass-Bag Filter equipped with sonic generators cleans cement kiln gases. Sound waves dislodge collected dust without wear or fracture of cloth.

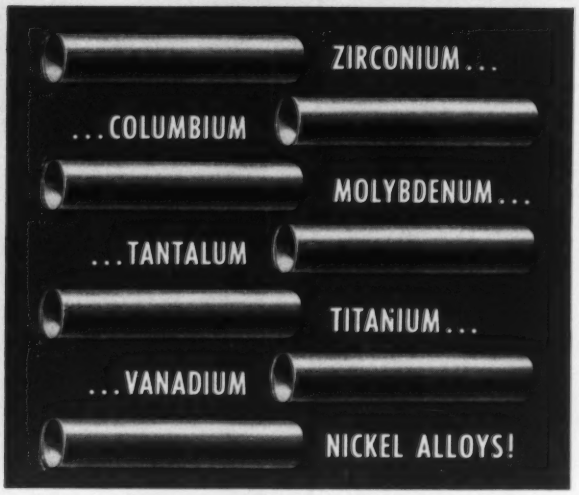
DRACCO *airstream* conveyors
dust control equipment

FULLER COMPANY GENERAL AMERICA









You can buy Wolverine tube in special metals—right now!

For more than five years, using the tubing industry's largest and most complete research and development facilities, Wolverine Tube research engineers have been working with zirconium, columbium, molybdenum, tantalum, titanium, vanadium and nickel alloys.

Thus, the know-how is now available to permit American industry to specify seamless tubing manufactured from these metals – tubing with extremely high temperature properties and great corrosion resistance among other valuable physical attributes.

Wolverine Tube would be happy to discuss with you the list of applications where tubing made from these metals can help your company do a better job, more economically.

Write or call for more information—or "Ask Your Wolverine Tube Salesman—He Knows!"

WOLVERINE TUBE
DIVISION OF
Calumet & Hecla, Inc.
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Manufacturers of Quality-Controlled Tubing

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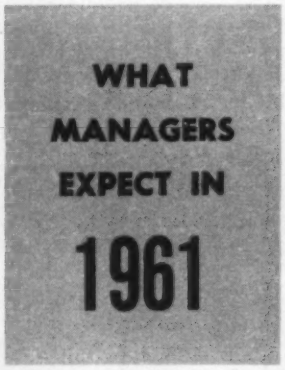


The editors are breaking tradition this year. STEEL's annual forecast of what metalworking's plant managers expect during 1961 will run in the Nov. 28 issue. In the past, the annual survey was a part of our January yearbook, but we know most of your planning for 1961 is done about this time; hence the move.

The forecasts have established a remarkable record for precision. Since World War II, with one exception, they have accurately shown the direction of the business trend. (To save you some leafing through old issues, the booboo occurred in 1958, a year in which a lot of crystal balls were shattered, and also a year 'most everybody would like to forget.)

STEEL's editors have found the most reliable source is the look-ahead thinking of the men who manage plants. So they asked 7600 general managers what their plants will do in 1961.

Coverage in Depth

STEEL's questions hit vital areas such as, production, costs, prices, employment, profits, expansion, new products, problems, research, and manpower shortages. There was also an open-end question which elicited comments "on business influences, problems, or technical developments that may affect the course of business in 1961."

For the complete picture, see next week's issue.

The Word for Managers

"We have read your Oct. 10 editorial ('How to Meet Competition!') with much interest and would like approval to reprint it in our Management Newsletter," comments Albert D. Farnum, manager of public relations, Wyman-Gordon Co., Worcester, Mass.

Permission Granted

"Thank you for the fine assist given our industry through your Oct. 3 article, '15 Ways Photography Pays Off,'" writes Robert T. Early, supervisor, sales training, Ansco Div. of General Aniline & Film Corp., Binghamton, N. Y.

"This article, typical of the kind of ideas you bring to your readers, should be of much value to many of them. It is certainly of great value to us (and helps) industry . . . know how it can benefit through photography. We would appreciate receiving a reprint . . . and permission to reproduce it for distribution to our salesmen."

More on Competition

R. S. Rice, director of procurement, Laundry Group, Whirlpool Corp., St. Joseph, Mich., said: "I have just finished your Oct. 10 editorial ('How to Meet Competition!') and was impressed with the message . . . it applies to industry in general as well as gray iron.

"I would like permission to call its contents to the attention of our suppliers to emphasize the need for progress via new ideas and innovation."

We Surveyed Winners . . .

. . . of Honorable Mention awards in our Usership Idea of the Month Contests to make sure none of the lighters went astray. Among the answers was this one from H. K. Eitelman, process control technician, Ordnance Dept., Defense Electronics Div., Pittsfield, Mass., General Electric Co.: "Though I received my lighter, I find myself using matches to avoid the possibility of wearing it out. That lighter is one of my prized possessions."

Mr. Eitelman, the lighter is a *Usership* award and has a lifetime guarantee. Use it, by all means.

The reply from our anonymous winner in March offered a wry twist: "Yes, I received my lighter, *the* $500 *went astray!*"

In this case, we say . . .

You Can Win $1000 This Month . . .

. . .in STEEL's Usership Idea of the Month Contest. Tell us, in 300 words or less, how you plan to USE an article or advertisement in this issue (or any other issue published this month—November, 1960) to help you accomplish an important personal or company objective. Be as specific as you can. If in the opinion of the judges, yours is the best idea submitted—**you will win $500.**

There's more . . . you will win an additional $500 if you furnish written proof that you accomplished your objective. Proof must be sub-

TIME SAVINGS!

Here's how Ex-Cell-O's Numera-Trol system of tape-controlled precision machine tools cuts costs for three modern manufacturers . . .

Precision Contouring Machine, controllable to .000025", saves 112 hours lead time, 54 hours grinding time in production of this templet.

Large steam turbine blade is produced by Precision Profiling Machine. Lead time saved, 120 hours; machining time saved, 78 hours.

Fuel control cam, produced by Precision Cam-Milling Machine, goes from performance curve to machined part in just 47.5 hours. Former method took 230 hours.

How many hours can Ex-Cell-O Numera-Trol save for you? For a prompt answer, see your Ex-Cell-O Representative, or call or write direct—and be sure to ask for your free copy of "A Guidebook to Numerically Controlled Machine Tools."

NUMERA-TROL (XLO)

PRODUCED BY

EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN 60-58

EX-CELL-O FOR PRECISION

mitted within six months after you are declared winner of STEEL's Usership Idea of the Month Award.

Please identify your letters as Usership entries. They will be judged by a committee of STEEL's editors. All letters become STEEL's property.

You can enter as many times as you wish. Send your entries to me, Ed Service, Servicenter, STEEL, 1213 W. Third St., Cleveland 13, Ohio. **Deadline for this month's contest is Jan. 1, 1961.**

Research Pays Off

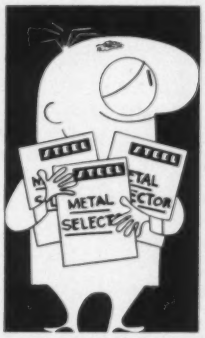
"I am engaged in a special project dealing with reduction and control of losses of productive materials in our plant," writes Michael J. Bourke, Flint (Mich.) plant, Ternstedt Div., General Motors Corp.

"While researching this project, I ran across one of your Materials Efficiency articles . . . please send me this series plus the one on Production Efficiency."

A Purchaser Notes . . .

. . . "I would appreciate your sending me two copies of the article, 'How to Build a Materials Team,' from your Oct. 24 issue . . . This is one of the finest articles I have seen on the subject," says Raymond A. Weckstein, manager, purchasing, G-V Controls Inc., Livingston, N. J.

The Key Words . . .



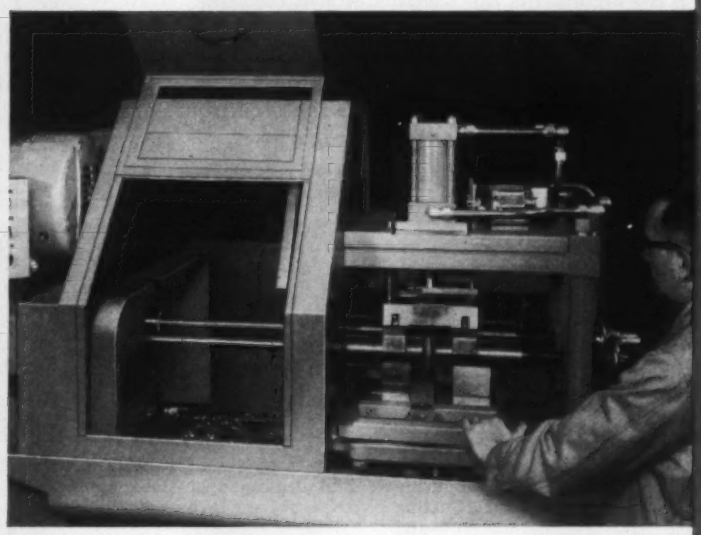
. . . in letters from readers who request our 1960 Metal Selector read: "time saver . . . best reference . . . valuable source . . . comprehensive . . . use it daily . . . handy . . ." and so the paeans go. Our Editorial Service folks say 578 letters have been processed with an average of about ten copies of the Selector going out per letter.

If you'd like to have a copy, drop a line to STEEL, Editorial Service, 1213 W. Third St., Cleveland 13, Ohio. The tab is minimal. One copy is free, two bits each for two to ten copies, a discount of 20 per cent on greater quantities.

'Congratulations . . .

. . . on your fine editorial about the General Electric strike," said John C. Freeman, president, Association of Industrial Advertisers, New York. (STEEL, Oct. 17, p. 77.) "Subsequent developments in that situation seem to bear out everything you say . . . we all hope the present situation at GE will give all labor leaders something to think about."

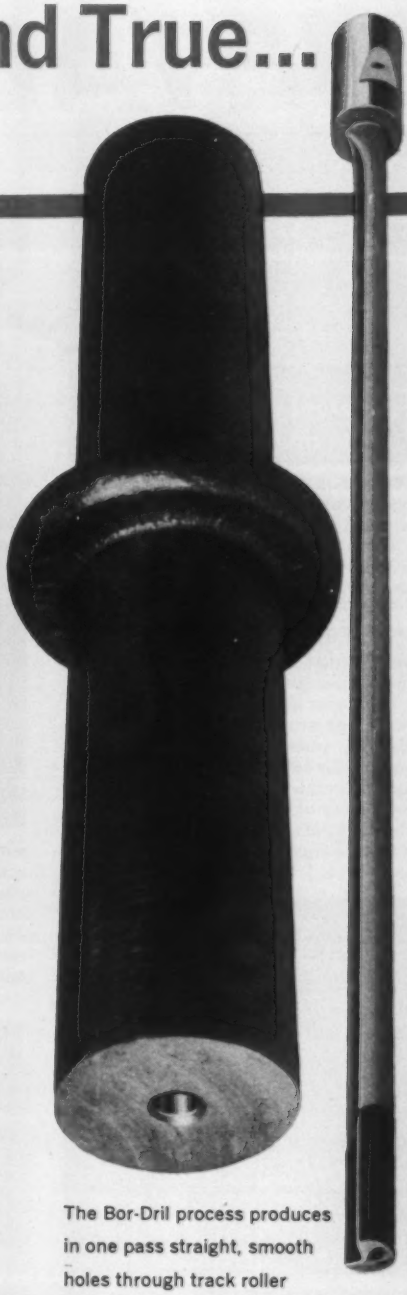
Deep Holes...Fast and True... with Ex-Cell-O BOR-DRIL



Drilling 11/16″ diameter holes the full length of 22½″-long forgings posed a tough problem for production engineers who need the economy of volume output, the time-savings of one-step operations, and the performance of precision equipment. But they found the answer in Bor-Dril, Ex-Cell-O's process for gun-type drilling with standard production boring machines.

Measured in terms of production efficiency, the result is 20 pieces per hour, from an Ex-Cell-O Model 752 Precision Boring Machine set up for Bor-Drilling. Secondary operations are eliminated.

Bor-Dril can be applied easily and economically wherever you have long, small-diameter holes to produce to precision tolerances. See your Ex-Cell-O Representative, or submit your requirements direct to Ex-Cell-O for prompt analysis and cost estimate.



The Bor-Dril process produces in one pass straight, smooth holes through track roller shafts 22½″ long and weighing about 75 pounds each. Production is 20 pieces per hour on the two-station machine.

60-30

EX-CELL-O FOR PRECISION

PRECISION MACHINE TOOLS • GRINDING AND BORING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • TORQUE ACTUATORS • CONTOUR PROJECTORS • GAGES AND GAGING EQUIPMENT • GRANITE SURFACE PLATES • COMPUTER PRODUCTS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • ATOMIC ENERGY EQUIPMENT • DAIRY AND OTHER PACKAGING EQUIPMENT

Machinery Division

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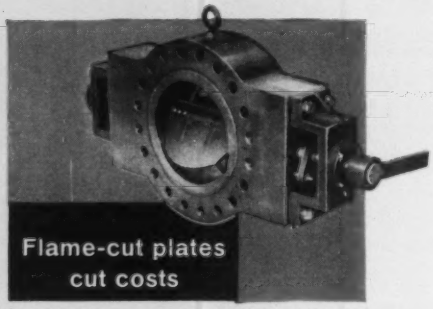
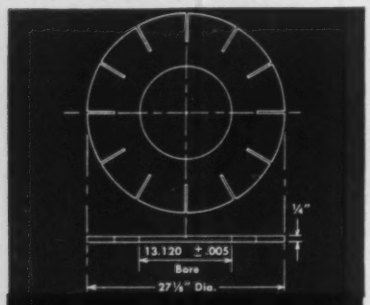


Flame-cut plates cut costs

HIGH REJECTS: Use of flat steel castings for valve bodies, with I. D. ranging from 4" to 60", accounted for increases in costs for this manufacturer. Pattern costs rose because of numerous changes . . . rejects were high due to porosity and other casting faults that showed up only after machining.

HIGH QUALITY: Ryerson recommended using flame-cut plates ranging in thickness from 1" to 8". Results: greater production flexibility, faster delivery, lower cost and a stronger product for this high-pressure service. Tight Ryerson quality control delivered plates of exceptionally clean surface to exact thickness of finished product, requiring little machining.



Machine cut rings solve problem

PLATES REQUESTED: Ryerson was asked to bid on supplying ¼" Type 410 stainless in 27½" square plates. Material was to be used for orifice plates for 16" burner, subjected to elevated temperatures.

RINGS RECOMMENDED: Going beyond material specs, the Ryerson representative found that the customer intended to cut plate into 27⅛"-diameter rings with 13.120" bore—and then mill 12 slots in outer diameter for expansion relief. Knowing the application, Ryerson recommended supplying machine-cut rings in which slots could then be punched rather than milled. Production savings enabled switching to Type 304 at less cost than Type 410 with slots milled.

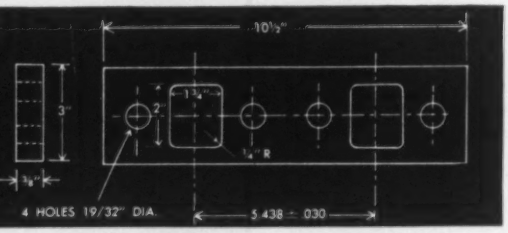
Look at these random examples and see how Ryerson Metalogics sparks real savings by continually searching for and suggesting new materials, methods and techniques.

The broadest experience anywhere combines with the widest range of stocks available to offer you unbiased recommendations on the best material for any job—be it steel, aluminum or plastics. Always the right metal-fabricating machine, too—for Ryerson is the nation's largest distributor.

Your Ryerson representative is "Metalogics-trained" to help you *value-analyze* selection, fabrication and application problems. Get his constructive ideas soon, and see how he can help you select and apply material from our vast stocks. It's the "Metalogical" thing to do.

**The Ryerson science of giving optimum value for every purchasing dollar.*

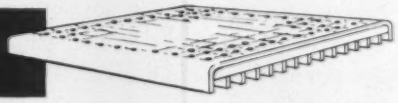
Saved: $100 per thousand



PROBLEM: Muffler manufacturer required accurately finished mounting plates made from ⅜" x 3" bar. Cutting bars to size, burning 1¾" x 2" holes and drilling four 19/32" holes proved time-consuming and expensive.

SOLUTION: Ryerson recommended that they eliminate cutting, burning and drilling operations by stamping the part from Ryerson forming-quality plate. One operation instead of three cut costs $100.00 per thousand pieces and quickly justified the small initial investment in dies.

Suggestion saves 85%



ASKED FOR: Customer wanted 1" hot rolled plate to cover about 80' of 24" open trench. Plate was to be cut into 24" x 27" segments—each containing 900 ⅜" holes to filter the product.

RECOMMENDED: After studying application and cost, Ryerson recommended a design combining perforated light plate, formed to channel shape, and grating for structural support. Ryerson experience and imagination saved 85% of the original cost.

Soft touch on fabricating sheets

THE NEED: Cold rolled sheets that would take severe forming and retain smooth, dull surface for high lacquer finish. Sheet quality was found on inspection to vary widely from one shipment to the next, causing variations in forming and finishing operations . . . high reject rate.

THE ANSWER: The Ryerson representative showed how our stringent quality controls would assure consistent quality on every shipment so that forming and finishing could be standardized for better results . . . lower production cost figures

ACTION

Production upped 30%

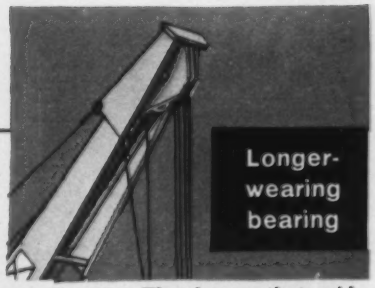
BEFORE: Job shop was using MT 1015 tubing in the manufacture of this coupling. Machinability was satisfactory, but rising costs of operation led to a search for ways to economize.

AFTER: Careful study by the Ryerson representative brought about a change in material. He recommended using Ledloy® 170 tubing, which increased machining speed to 170 s.f.m. and stepped up production 30%. Ryerson's stocks include the widest range of fast machining alloys—types and sizes to fit your every need.

PVC cuts costs 50%

OLD WAY: A screw machine shop used nylon in the manufacture of nipple adapter and coupling nuts—until a Ryerson representative came on the scene.

NEW WAY: At his suggestion, they changed to Ryertex-Omicron PVC—cut costs 50%. PVC machined better—to closer tolerances, with improved finish . . . ran faster without "gumming." Note exact cutting of threads and barbs. Threads fit perfectly.



Longer-wearing bearing

5-DAY LIFE: The sheaves that guide the enormous digging buckets of underwater dredges take a very severe load. Bronze bearing in the sheaves had to be replaced every four or five days.

5 MONTHS, SO FAR: After discussing the problem with a Ryerson man, the chief engineer decided to try a bearing made of Ryertex. The change was made, and five months later hardly any wear was noticeable! With its low friction coefficient, Ryertex is nonbinding, even on itself.

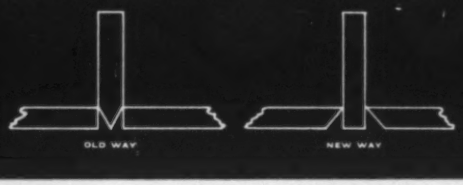
Deeper cut... better finish

SEARCH: Complicated machining of a carbide grade gear shaft included cuts up to ½". It was discovered that required machining was too slow with the steel chosen for the job.
ANSWER: Rycut® 40 was recommended by the Ryerson representative. This free machining alloy fit the situation perfectly. The company found that Rycut 40 machined at 250 s.f.m., gave a better finish, increased tool life, and lowered total per-piece cost. An alloy in the Rycut series may well lower your costs.

2 metalworking machines for the price of 1

A fabricator of stainless steel kitchen equipment was recently in the market for a new squaring shear. The one under consideration had a gap-type frame which would enable him to do an important notching operation—necessary for certain sink tops. After careful study, a Ryerson machinery specialist recommended *two* pieces of equipment instead of one at no increase in total cost. The first, an underdriven shear. The second, a universal-type sheet metalworking machine that would do the required notching, plus many other jobs—adding versatility to the entire operation.

New material, method and results



OLD: Rows of vertical aluminum grid members were attached to an aluminum base plate by notching the grid members and welding. (2024-T3 aluminum plate was used.) However, upon cooling, welds fractured—causing a high reject rate on this assembly.
NEW: A Ryerson representative suggested undercutting the base plate (as shown) instead of the grid members. This exposed a greater area to heat and permitted a larger deposit of weld material. Another Ryerson suggestion: change material to 5052-H34 aluminum, which responds better to welding operations.

PRODUCTS IN STOCK

STEEL—carbon, alloy, and stainless steel—bars, structurals, plates, sheets and strip, tubing, etc.

ALUMINUM—sheet (including new building sheet), plate, coils, rod and bar, tubing and pipe, building products, etc.

INDUSTRIAL PLASTICS—Ryertex-Omicron PVC in all forms. Also Ryertex® laminated phenolic plastics for bearings.

METALWORKING MACHINERY—the broadest line available from a single source for every kind of metal fabrication. Also specialized line of material handling equipment.

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RYERSON PLUS VALUE

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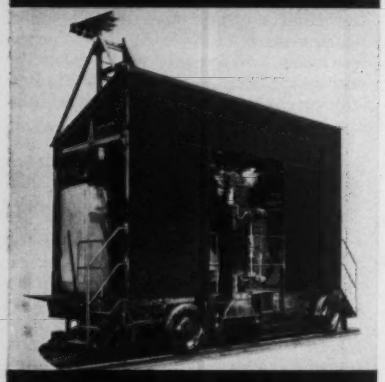
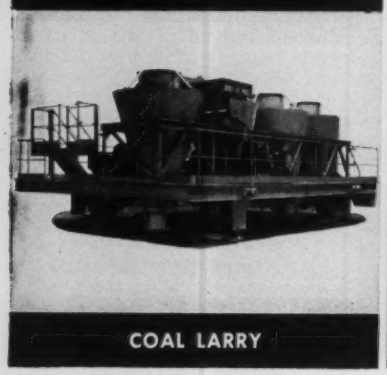


DOOR MACHINE



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Nov. 27-30, Air Conditioning & Refrigeration Institute: Annual meeting, Hollywood Beach Hotel, Hollywood Beach, Fla. Institute's address: 1346 Connecticut Ave. N.W., Washington, D. C. Managing director: George S. Jones Jr.

Nov. 27-Dec. 2, American Society of Mechanical Engineers: Annual meeting, Statler-Hilton Hotel, New York. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: O. B. Schier.

Nov. 28-Dec. 2, Exposition of Power & Mechanical Engineering: Coliseum, New York. Information: International Exposition Co., 480 Lexington Ave., New York 17, N. Y.

Nov. 29-Dec. 1, Electronic Industries Association: Winter meeting, Fairmont Hotel, San Francisco. Association's address: 1721 DeSales St. N.W., Washington 6, D. C. Secretary: James D. Secrest.

Nov. 30-Dec. 2, Metallurgical Society of AIME: Electric furnace conference, Morrison Hotel, Chicago. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: R. W. Shearman.

Dec. 3-6, American Institute of Chemical Engineers: Annual meeting, New Yorker Hotel, New York. Institute's address: 25 W. 45th St., New York 36, New York. Secretary: F. J. Van Antwerpen.

Dec. 6, Electric Overhead Crane Institute: Annual meeting, Carlton House, Pittsburgh. Institute's address: 1 Thomas Circle, Washington 5, D. C. Executive secretary: J. H. Peritz.

Dec. 7-9, National Association of Manufacturers: Annual meeting, Waldorf-Astoria Hotel, New York. Association's address: 2 E. 48th St., New York 17, N. Y. Executive vice president: Charles R. Sligh Jr.

Dec. 12-15, Atomic Industrial Forum and American Nuclear Society: Atomic industry exhibitions and conferences, California Masonic Memorial Temple, Fairmont and Mark Hopkins Hotels, San Francisco. Information: AIF, 3 E. 54th St., New York 22, N. Y. Executive manager: Charles Robbins.

Dec. 12-15, Industrial Building Exposition & Congress: Coliseum, New York. Information: Clapp & Poliak Inc., 341 Madison Ave., New York 17, N. Y.

Dec. 28-30, American Marketing Association: Annual convention and exhibit, Coronado Hotel, St. Louis. Association's address: 27 E. Monroe St., Chicago 3, Ill. Executive director: Vance E. Lockhart.

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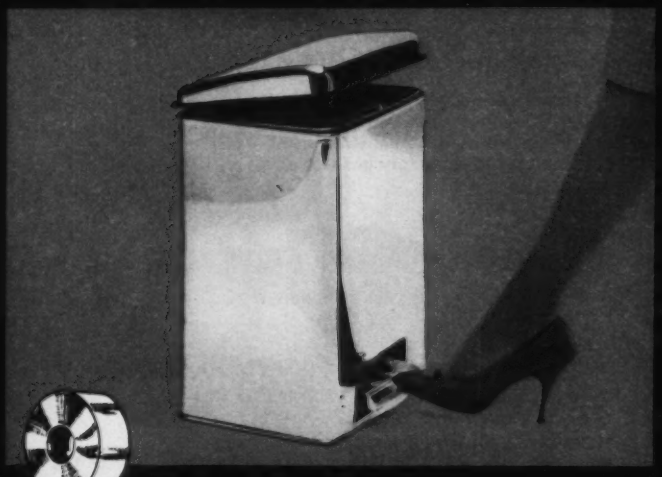
IN MOST ANY ROOM

IN THE GAME ROOM



IN THE KITCHEN

These eye-catching products use functionally a basic Nickeloid Metal. The finish of Chromium, Nickel, Brass or Copper is electroplated to a base metal, usually Steel (but often Zinc, Brass or Copper).

Mostly, Nickeloid Metals are supplied in continuous coils in widths up to 24" for modern, low cost fabrication. They're also available in sheets and strips. Optional: bright or satin finishes, plating one or both sides, a galaxy of stunning patterns and crimps.

Quality plating produces metals so durable they can be fabricated, even quite severely drawn or bent. Rejects minimized. For severe stamping, we offer Mar-Not protective coating that is easily peeled off after its job is done.

These handsome articles of daily use are striking indeed! Not a little of this is achieved by the functional use of bright plated Nickeloid Metals in Chrome, Brass or Copper finishes. But look again! These pictures carry a deeper, even more dramatic story . . . the story of a *new concept* of manufacture. Not always do artisans work with raw steel sheet. Not always is the final finish applied by the extra step of painting or plating. With Nickeloid Metals this finish is built-in, and it's done by a company which has dedicated itself to electroplating of sheets and coils for industry for over 60 years! The use of Nickeloid Metals as a pre-finished raw material proves the theorem that a straight line is the shortest distance between two points. Write for free Introductory Kit that unfolds the entire story and provides you with metal samples. Or, phone a Nickeloid sales office in one of the principal cities.

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America's Pioneer Manufacturer of Pre-Finished Metals—Since 1898

A Progress Report on an important invention

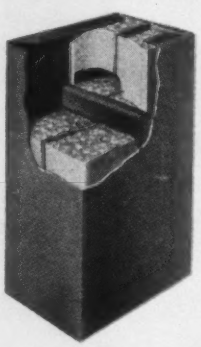
H-W METALKASE REFRACTORIES

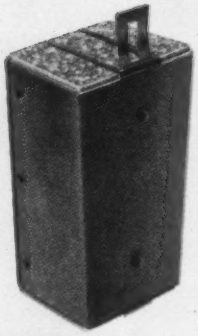
Initiated and continually advanced through numerous modifications by Harbison-Walker, these refractories contribute greatly to many noteworthy metallurgical developments.

Among all basic refractories, metalkase brick have superior spalling resistance. The metal casing and plating improve stress relief and appreciably reduce any peeling tendency.

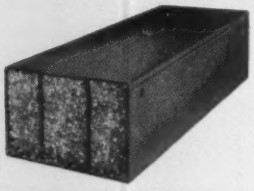
Metalkase brick are furnished in various sizes and shapes. They are made in both chemically-bonded and hard-fired basic refractories of various compositions which are used with particular benefit in suspended roofs and in walls in steel and nonferrous metallurgical furnaces.

METALKASE SUSPENDED ROOF ASSEMBLY. This composite basic brick roof shape is made with both hard-fired and chemically-bonded basic brick with interior plates—ready for use as received. Suspending member is inserted, turned through 90 degrees becoming automatically locked. Important benefits result from the prefired refractory in some applications.

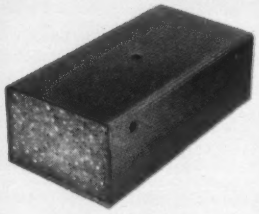




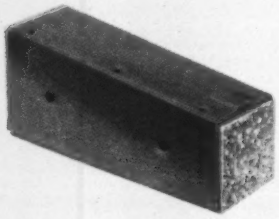
TABKASE MAGNEX OHR XXP brick externally and internally plated have a stainless steel tab welded inside the insert which is flat with the end as shipped. At the place of use, they are bent to the upright position and hung back-to-back in place. This innovation in design contributes materially to long service and notable economy in parts of open hearth steel furnaces.



METALKASE XXP are chemically-bonded basic brick formed under high pressure with two internal plates. They are available in various compositions and are furnished in standard sizes and suspended arch and other shapes. METALKASE MAGNEX OHR most widely used in open hearth steel furnace roofs continues establishing unit roof life records. The high purity magnesia produced by Harbison-Walker from Michigan brines and stabilized as dense periclase is an important constituent which measurably enhances the desirable properties of this refractory.



METALKASE BRICK (externally plated), both hard-burned and chemically-bonded in various compositions, are made with either three or four-sided steel casings. Used for many parts of open hearth steel furnaces, for sidewalls and door jambs of electric furnaces and in other applications requiring high spalling resistance in basic composition, they very satisfactorily withstand extremely severe conditions.



EXKASE basic roof brick are made with patented four-sided welded cases provided with a bendable projection which insures proper expansion allowance. This automatic means of accurate expansion allowance avoids the need of burn-out spacers. With EXKASE, furnished in various key sizes for roofs, installation is simpler and costs less.

Other designs of metalkase include special shapes for patching, unusually large sizes, rotary kiln arch and wedge blocks, various suspended arch shapes and many others.

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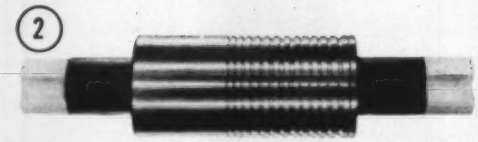

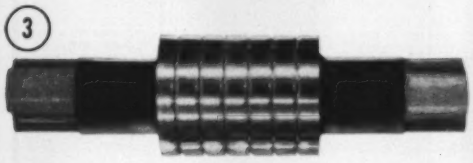

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Sheffield is currently building Model 190 grinders for rolls as large as 6′ x 14″ and as heavy as 3000 pounds.

Write for full details about Sheffield roll grinders, Crushtrue® grinding, and Sheffield's contract grinding services.

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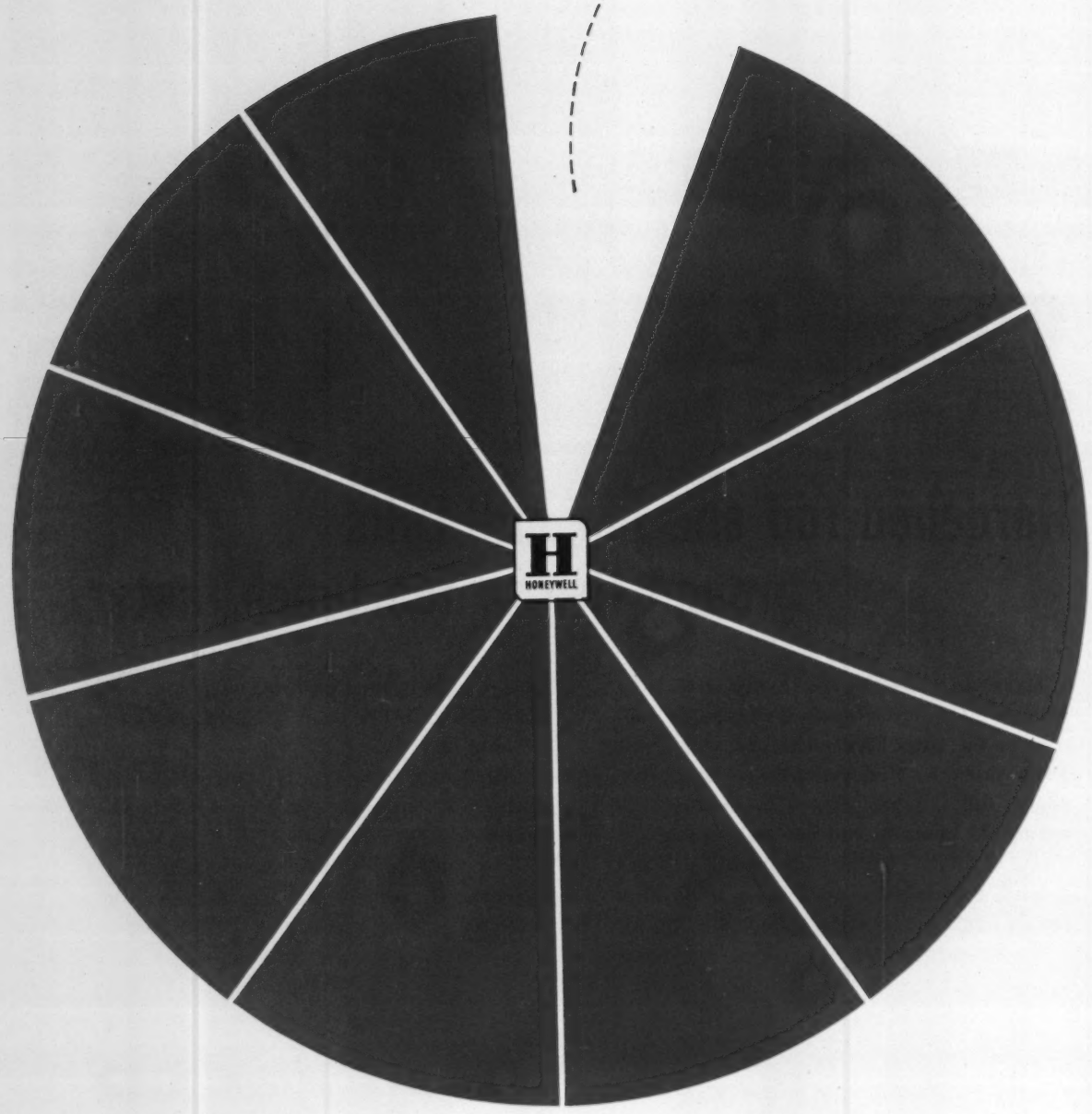
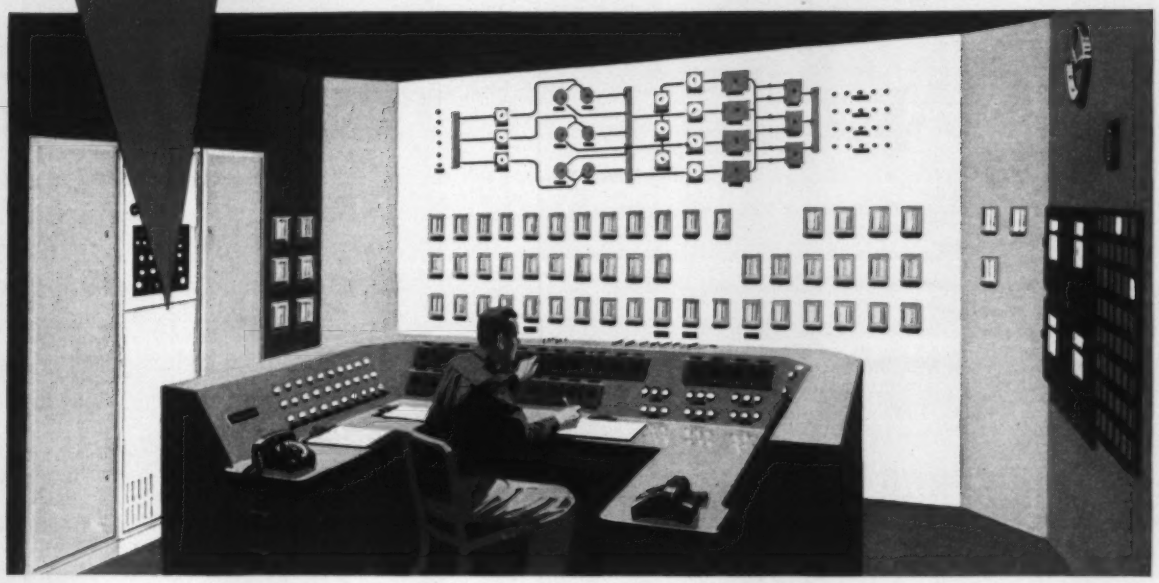


PART OF A PROCESS CONTROL SYSTEM



You hear a lot about industrial process computers these days. As processes get bigger, faster and more complex, computers are being used as the reins as well as the brains—for control as well as data reduction—in fields as diverse as ice cream making and petroleum refining.

The Big Picture. But like the human brain, a computer cannot work independently. It must receive raw information from sensory instruments. Where automatic control is involved, it must transmit its logic to "muscle" instruments which translate decisions into action. The computer is part of a system, and, like the human body, the system functions effectively only when all of its parts are perfectly coordinated. In Honeywell systems, this compatibility of *all* system components is built in, for all Honeywell instruments and controls are *made* to complement each other.

Process Experience plus Computer Know-How. Equally important, a computer must be properly applied. Computers are "illiterate." They must be told what to do and how to do it by men who know. In engineering a computer-directed instrumentation system that will be precisely matched to your needs, Honeywell systems engineers draw on more than 75 years of measurement and control experience.

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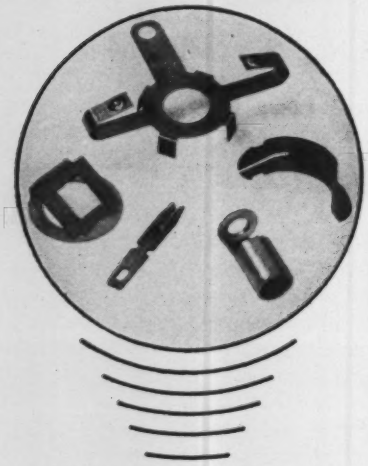

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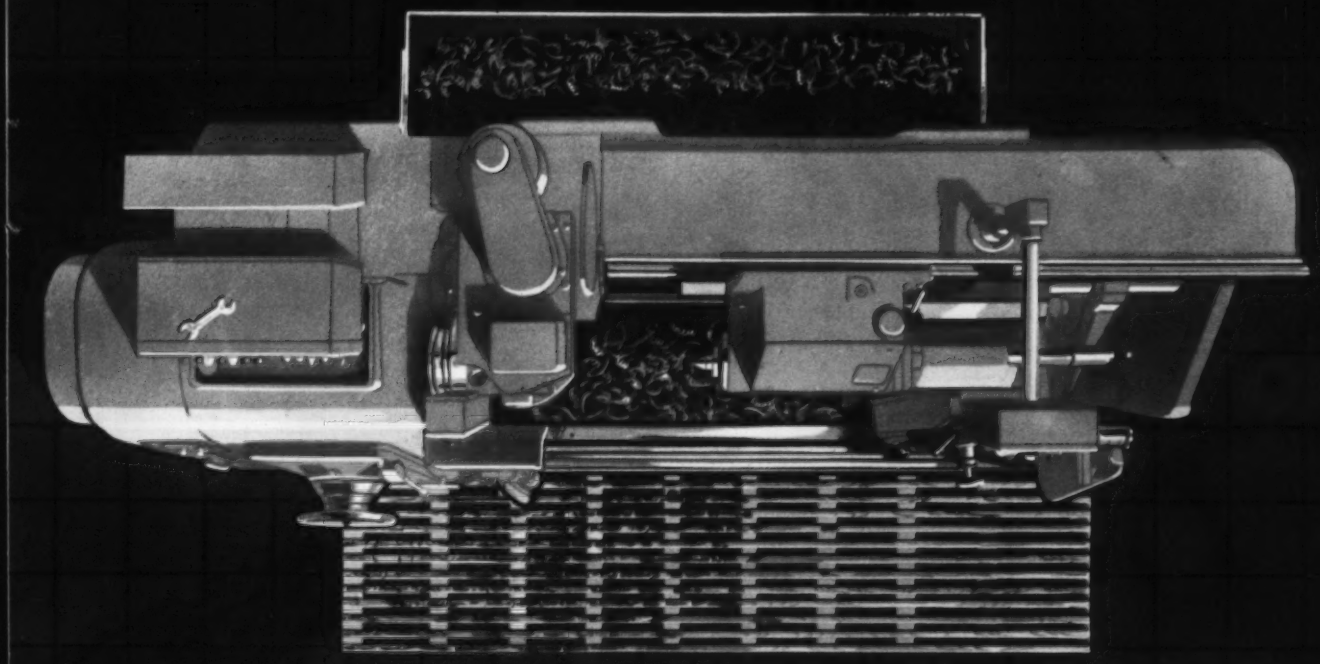


You can turn a profit on a New Britain +GF+ Copying Lathe

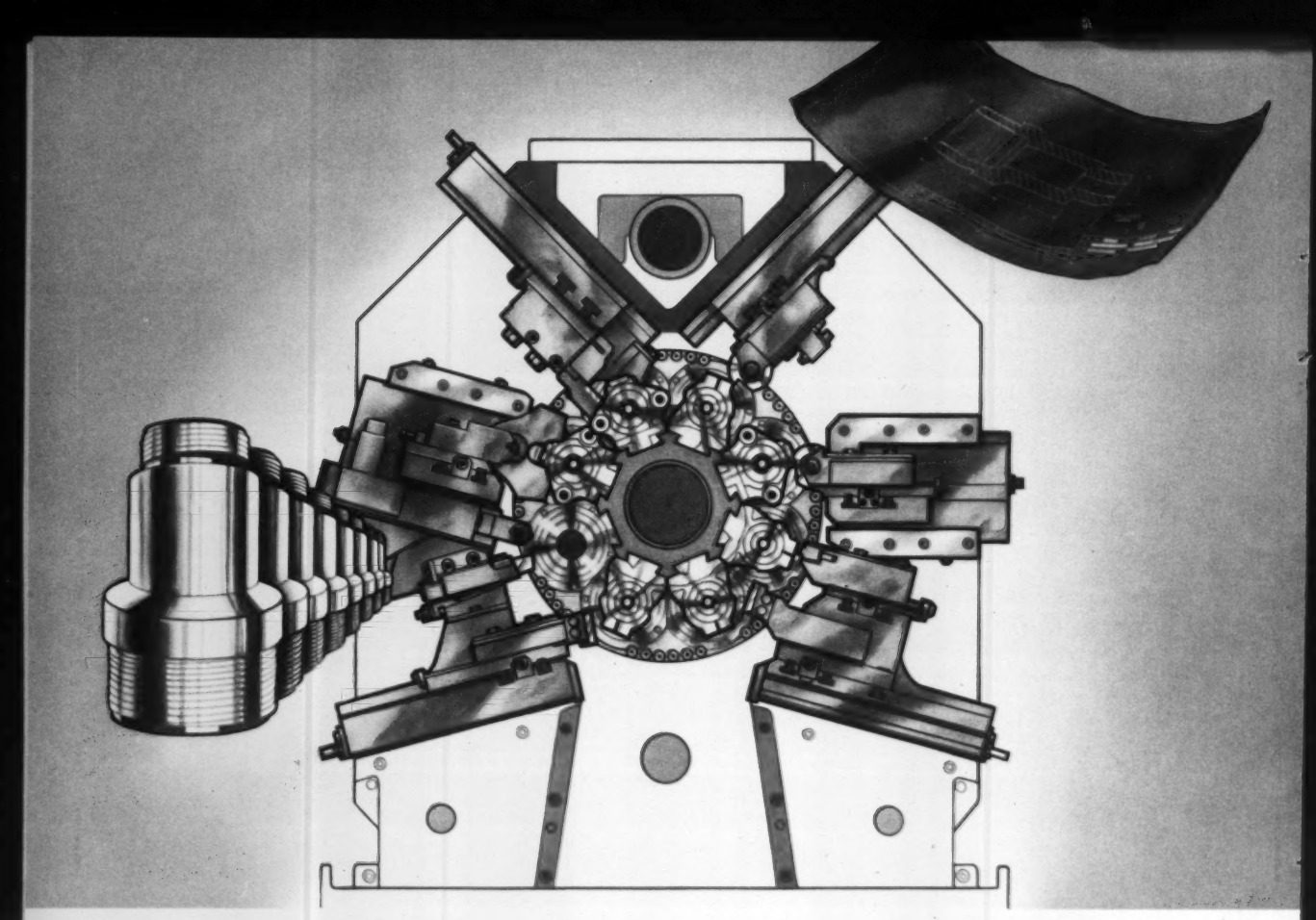
Here's a birdseye view of a New Britain **+GF+** Copying Lathe. It shows some important differences between this machine and conventional lathes with copying attachments. The point here is this—*the most effective use of the single-tool copy-turning principle can be made only with a machine designed from the ground up for this type of work.* The New Britain **+GF+** is just such a machine. Notice the chip pan. It's big (it has to be) and located for easy removal of chips from the back of the machine. The design of the work area allows for unobstructed free-fall of chips out of the way and into the pan.

The New Britain **+GF+** is massive and rugged, with plenty of power—up to 40 h.p., if you need it. It's simple to operate, quick to set up and change over. The single-point tool can be changed in one minute and it out-produces gang tooling setups in the bargain. Turning is controlled by either a template or a prototype. External and internal copying are accomplished in one set-up with special tooling.

The possibilities for short or long run chucked and between centers work on the **+GF+** are wide and varied. Because the work is produced with good surface finish and dimensional accuracy, grinding can be reduced and, in some instances, eliminated. Large diameters are broken down economically by successive parallel cuts, automatically if desired, with optional two-cut or multi-cut recycling.

You've got to see one of these machines in action to fully understand the kind and quantity of work they are capable of producing. Contact your New Britain Representative for demonstration arrangements or write The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Connecticut.

THE NEW BRITAIN MACHINE COMPANY
New Britain-Gridley Machine Division - New Britain, Connecticut



Unlimited tooling combinations with New Britain Bar Machines

Nothing can out-date your operation quicker than better machines in the hands of a competitor. In the race to keep ahead on quality, price and delivery, nothing can put you out front faster than machines capable of consistently producing the highest quantity of finished pieces at the lowest possible cost. New Britain's new series of bar machines represents in every way the most advanced bar-turning units available. Each of the four-, six- and eight-spindle models has been redesigned, adding new features and improving older ones. Unlimited cross slide and end-working tool combinations, extremely fast operation (even on stainless) and a variety of models and features to choose from add up to some good reasons for incorporating New Britains into your replacement or production expansion plans.

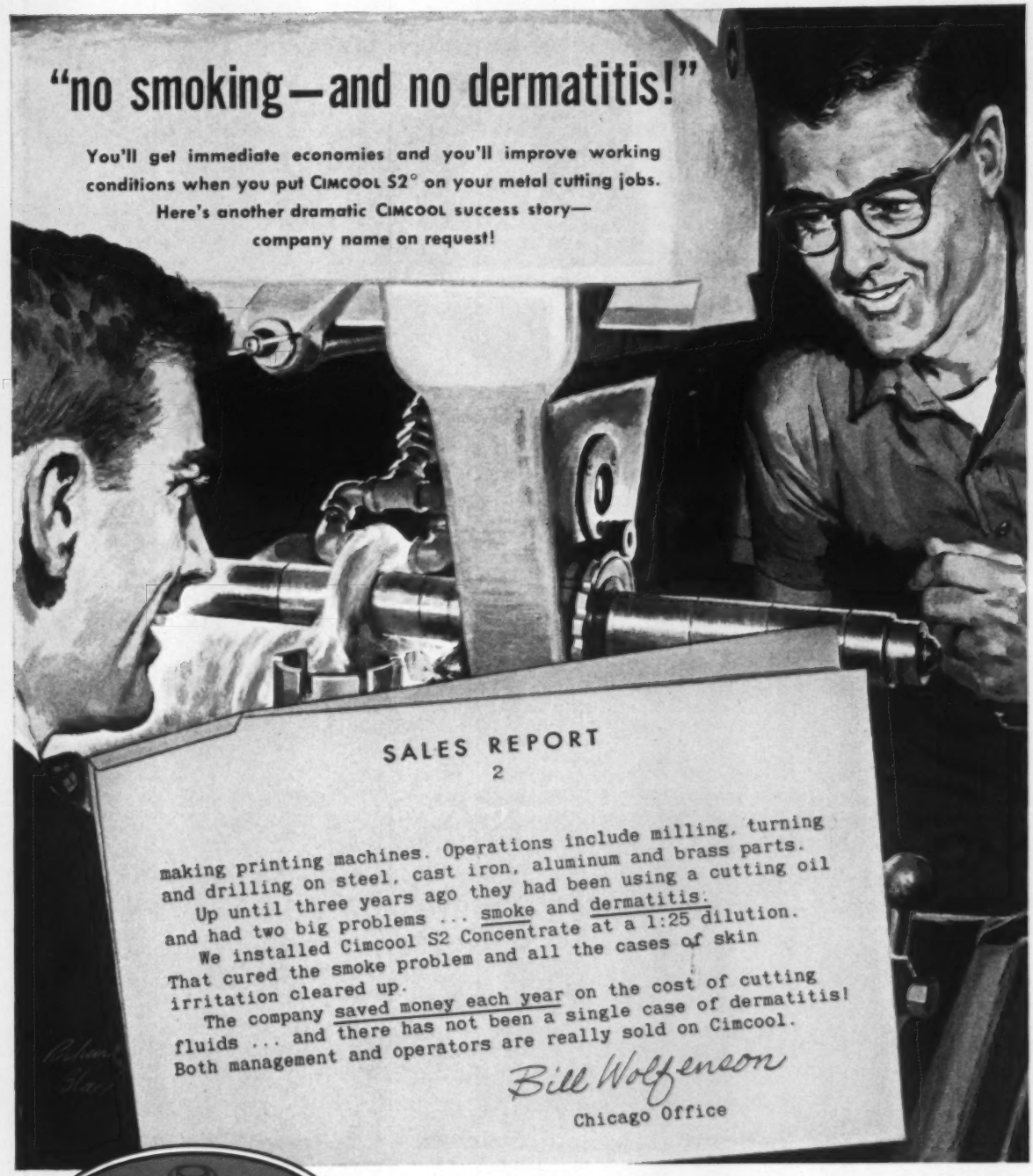
The eight-spindle model is the largest, most modern eight-spindle bar machine available. It has a stock capacity of up to 2⅝" and provides six independently-operated cross slides. As with all New Britain bar machines, the operations of the cross slides and end-working tool slide are disc-cam controlled for positive actuation, close tolerance machining and easy, rapid change-overs.

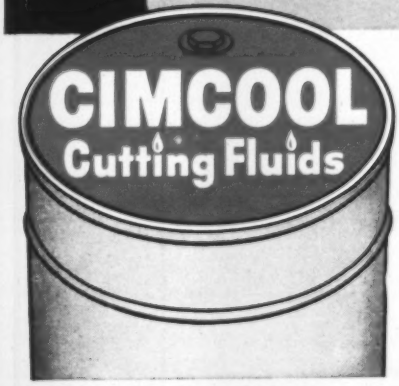
This is only a very small part of a story that is bound to interest you. The whole story and its significance in terms of your profits is available from your New Britain Representative. If you prefer, contact us directly at The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Connecticut.

THE NEW BRITAIN MACHINE COMPANY
New Britain-Gridley Machine Division - New Britain, Connecticut

"no smoking—and no dermatitis!"

You'll get immediate economies and you'll improve working conditions when you put CIMCOOL S2° on your metal cutting jobs. Here's another dramatic CIMCOOL success story— company name on request!


SALES REPORT
2
making printing machines. Operations include milling, turning and drilling on steel, cast iron, aluminum and brass parts.
Up until three years ago they had been using a cutting oil and had two big problems ... smoke and dermatitis.
We installed Cimcool S2 Concentrate at a 1:25 dilution. That cured the smoke problem and all the cases of skin irritation cleared up.
The company saved money each year on the cost of cutting fluids ... and there has not been a single case of dermatitis! Both management and operators are really sold on Cimcool.
Bill Wolfenson
Chicago Office



FOR 100% OF ALL METAL CUTTING JOBS

Production-proved products of The Cincinnati Milling Machine Co.

CIMCOOL S2 Concentrate — The pink fluid which covers 85% of all metal cutting jobs.
CIMPERIAL° — Newest in the famous, industry-proven line of CIMCOOL° Cutting Fluids.
CIMPLUS — The transparent grinding fluid which provides exceptional rust control.
CIMCUT Concentrates (AA, NC, SS) — For every job requiring an oil-base cutting fluid.
ALSO — CIMCOOL Tapping Compound — CIMCOOL Bactericide — CIMCOOL Machine Cleaner.

For full information on the complete family of CIMCOOL Cutting Fluids, call your CIMCOOL Distributor. Or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

°Trade Marks Reg. U. S. Pat. Off.

"Global Design of Our New Constellation Vacuum Cleaner Calls for Deep-Draw Quality, Excellent-Surface J&L Steel"

... The Hoover Company

The two hemispheres that make up the base and cover of the Hoover Constellation cleaner are each blanked from a flat piece of steel. With a single stroke of a stamping die, The Hoover Company forms perfect shells, 6.037 inches deep, for their Constellation cleaner. Key to this stamping operation is the excellent drawing quality of J&L 22-gage sheet steel.

Despite the severity of the draw, there are no breakage problems, no die mark problems, no "orange peeling" or strain lines.

Successful production of this spherical cleaner is possible because the J&L cold rolled sheet used at Hoover has three essential qualities: (1) Consistent Drawing Quality, (2) Excellent Surface Finish, and (3) No Age-Hardening.

Mr. Ralph O. Ross, Hoover's buyer of steel, believes: "Production would be vastly complicated, if not impossible, without cold rolled, drawing-quality, killed steel sheet. We would be hindered by metal breakage during the stamping operation, and troubled by die marks and surface imperfections on the completed spheres were it not for a number of advantages of the cold rolled sheet."

To get exactly the right J&L steel for special requirements in your own plant, contact your Steel Service Center. Or, write direct to *Jones & Laughlin Steel Corporation, 3 Gateway Center, Pittsburgh 30, Pennsylvania.*

Steel

This Steelmark identifies products made of steel. Place this mark on your products. And—look for it when you buy.

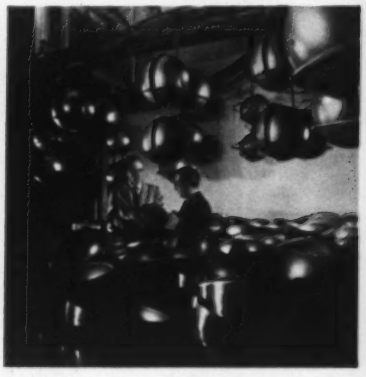
Jones & Laughlin Steel Corporation

3 Gateway Center, Pittsburgh 30, Pennsylvania

J&L STEEL

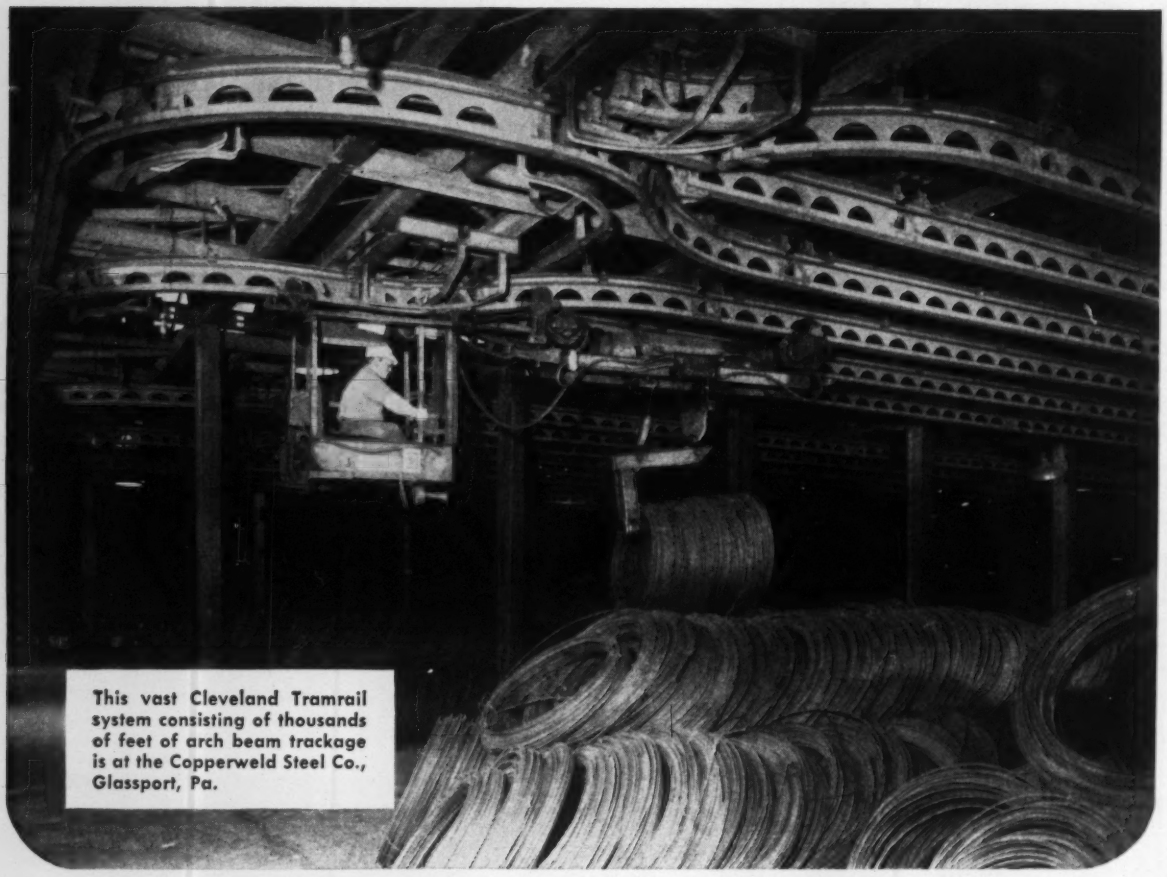
Above, left, 19-inch blanks are stamped from coils of J&L 22-gage drawing-quality cold rolled sheet steel. Flat blanks go next to a single-stroke drawing press which forms them into spherical shells.

Severe draw forms shells into 6.037 or 6.027 inch deep hemispheres with single press stroke. This operator positions flat blanks and removes stamped shells by hand. Excellent drawing quality of J&L sheet virtually eliminates breakage, strain marks, and "orange peeling" problems.



Surface finishes are examined by Chief Inspector of Finished Products, William Bauman (left), and Steel Buyer Ralph O. Ross. Quality surface finish of J&L sheet has greatly reduced number of shells "wheeled" (ground) before painting.

Final assembly is done by skilled men, each of whom puts together a complete cleaner. Each Hoover Constellation Cleaner is 100% inspected — electrically, functionally, and visually.



This vast Cleveland Tramrail system consisting of thousands of feet of arch beam trackage is at the Copperweld Steel Co., Glassport, Pa.

The *Most Practical* and *Lowest Cost* Method of Handling Wire and Rod

The headline words refer to overhead materials handling equipment and are powerfully strong, we admit. Yet we do not know of one engineer who is closely connected with the industry and experienced with all methods of handling, who will disagree.

Mills, large and small, from coast to coast, in the United States and Canada, have invested many millions of dollars in Cleveland Tramrail equipment to speed their wire and rod handling. The dividends that this huge investment has made possible, because of low-cost handling, have returned the original capital many times over.

If your company does not now enjoy the many benefits of Cleveland Tramrail, we urge you to get the "low-down" on what this equipment can do for you. A nearby sales engineer will be glad to give you the details without obligation.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
7818 E. 288 St., Wickliffe, Ohio.

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

ANOTHER NORTON PRODUCT

Why switch to resin-bonded belts?

You have at least two good reasons for switching to Behr-Manning resin-bonded abrasive belts:

1. They give you the benefit of cooler cutting through heat resistance in every step from roughing thru polishing, with minimum loading or shedding.

2. They give you the advantage of lasting much longer than glue-bond belts, easily justifying by production savings, their slightly higher initial cost.

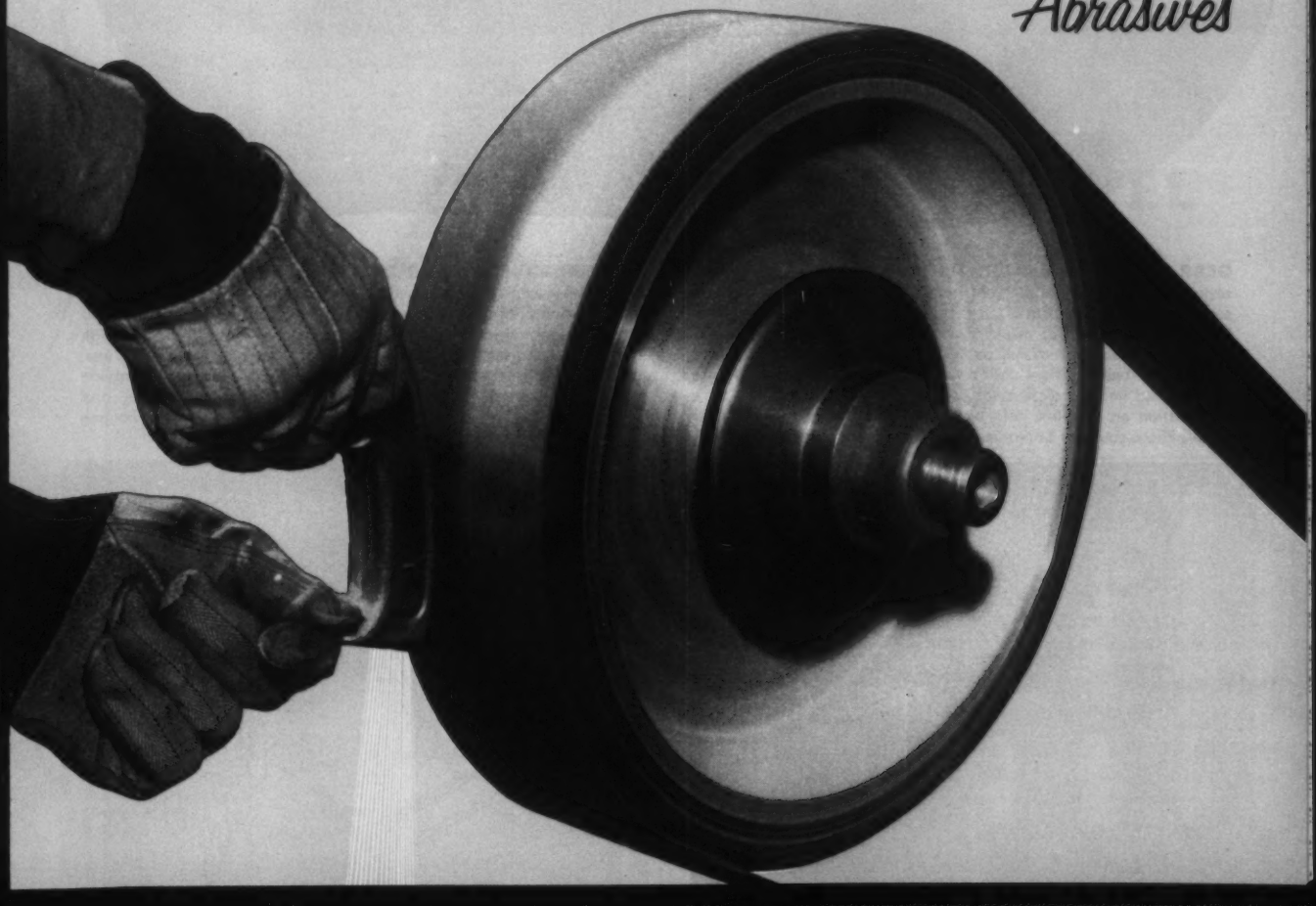
There are two principal types of Behr-Manning resin-bonded abrasive belts:

RESINALL® . . . an all resin-bonded, aggressive belt of strong X-weight cloth, for maximum heat resistance in most all rough and intermediate grinding.

RESINIZED® . . . a resin-over-glue belt of good heat resistance, in strong X-weight for flat polishing, and in flexible J-weight for contour polishing.

Prove the advantages yourself. Ask for an in-plant test. Write Dept. S-11, BEHR-MANNING Co., Troy, N. Y., a division of Norton Company.

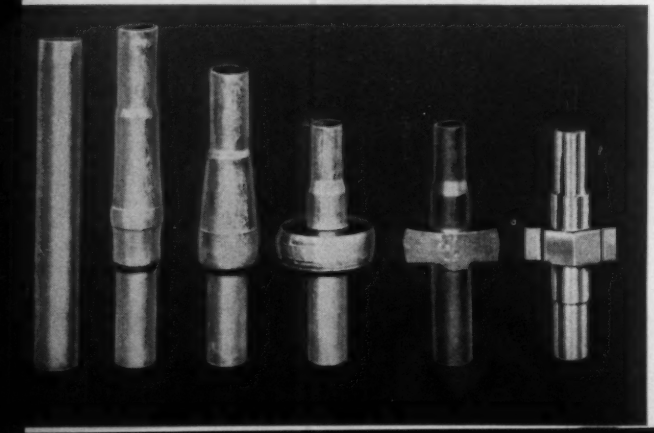
BEAR BRAND Abrasives

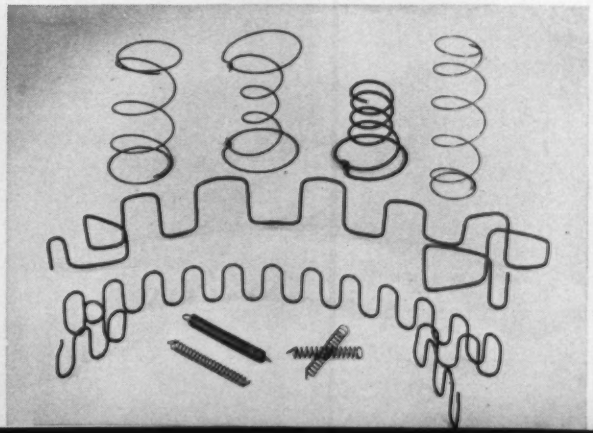


Newest addition to the REPUBLIC FASTENER FAMILY...

GEAR PRODUCTION COSTS DROP. Producing parts, like the segment gear pictured, by cold heading, cold extrusion, and upsetting speeds production and reduces machining. Steel from Republic's new 11" bar mill in Chicago is specially suited for this purpose. Advanced features on the new mill assure your bar stock with highly uniform flow characteristics, precise dimensional accuracy, and improved physical properties. Send coupon for more information on Republic cold extrusion and cold heading quality steels. Photo courtesy of National Machinery Company, Tiffin, Ohio.

MEETING DESIGN REQUIREMENTS: Republic Steel Wire has the necessary strength, ductility, and toughness for difficult forming operations. Republic produces many types for virtually any application: Manufacturer's Coarse Wires; Spring Wires (Standard High Carbon and MB High Carbon); Screw, Rivet, and Heading Wires. Republic wire metallurgists are at your service—ready to provide obligation-free assistance in the selection, application, and processing of wire to best meet your requirements. Mail coupon for details.





THE REPUBLIC MIDLAND WELD NUT

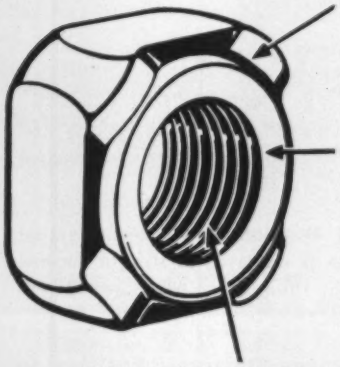
Providing you with the best fastener for every job ... that's the objective of Republic's Bolt and Nut Division. Newest addition to the more than 20,000 different types and sizes of standard Republic Fasteners . . . the Republic Midland Weld Nut.

Orginated and marketed by Midland-Ross Corporation, this top quality weld nut has been widely used for years by major manufacturers in many fields. Now, as a product of Republic Steel, it will continue to be made to the same high performance standards that have earned a reputation for consistent dependability.

PROVED DESIGN FEATURES mean fast, accurate positioning; more positive weld; sure holding power; and one man application makes this new Republic fastener ideal for the fabrication, fastening, or assembly of metal parts.

Republic Weld Nuts save time and money, solve many difficult design and assembly problems. Applied quickly and easily by any standard projection welding machine of proper capacity. For high speed operations, welding machines with automatic feeds are suggested. Mail the coupon for more data on the Republic Midland Weld Nut and its application for your products.

COMPARE THESE FEATURES



FOUR PROJECTIONS, rather than the three found on many competitive nuts, mean a more secure weld, assures level position, eliminates cross-threading.

CIRCULAR PILOT guides the nut rapidly and accurately into position, simplifies automatic feeding operations, protects threads from any possible weld spatter caused by improperly regulated welding equipment.

FULL DEPTH THREADING for maximum holding power. Close fitting unions anchor bolts for the life of the product, even under severe vibration.

PAY ONLY FOR THE MACHINABILITY YOU NEED. Smart way to trim material costs, and get just the degree of machinability and toughness you need . . . select from Republic's CENTURY SERIES high strength, stress relieved, cold finished steel bars. CENTURY SERIES bars are priced on a descending scale (as machinability decreases, price drops, too). Each of the five different grades has a minimum yield strength of 100,000 psi. Get complete information by sending the attached coupon for a free CENTURY SERIES booklet.

Republic's CENTURY SERIES C-1144
Republic's CENTURY SERIES C-1141
Republic's CENTURY SERIES C-1151
Republic's CENTURY SERIES C-1096
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☐ Have a wire metallurgist call
Please send more information on:
☐ Republic Midland Weld Nuts
☐ Cold Extrusion and Cold Heading Steels
☐ Wire ☐ CENTURY SERIES Cold Finished Bars

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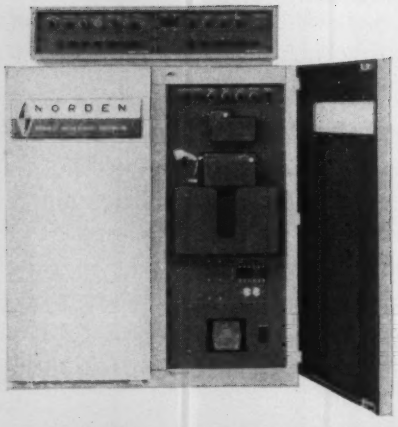
NORDEN

Modumatic control systems for automatic positioning



The Norden Series 600 is a numerical control system for automatic point-to-point linear or rotary positioning.

This system features a new concept in numerical control with modumatic design permitting the exact degree of automation required.

This new concept is achieved by an exclusive design utilizing an absolute digital feedback transducer, electronic circuitry, and visual display. It offers complete automatic positioning with input from either manual dial-in or punched tape. Display units provide continuous decimal readout of *actual* position—not command.

NORDEN 600 SERIES FEATURES:

Full Range Electronic Origin Select—allows desired offset to be quickly and easily dialed in by the operator on manual selector switches.

Actual Position Readout—the actual position is displayed in straight decimal form by illuminated numbers that are readable from twenty feet.

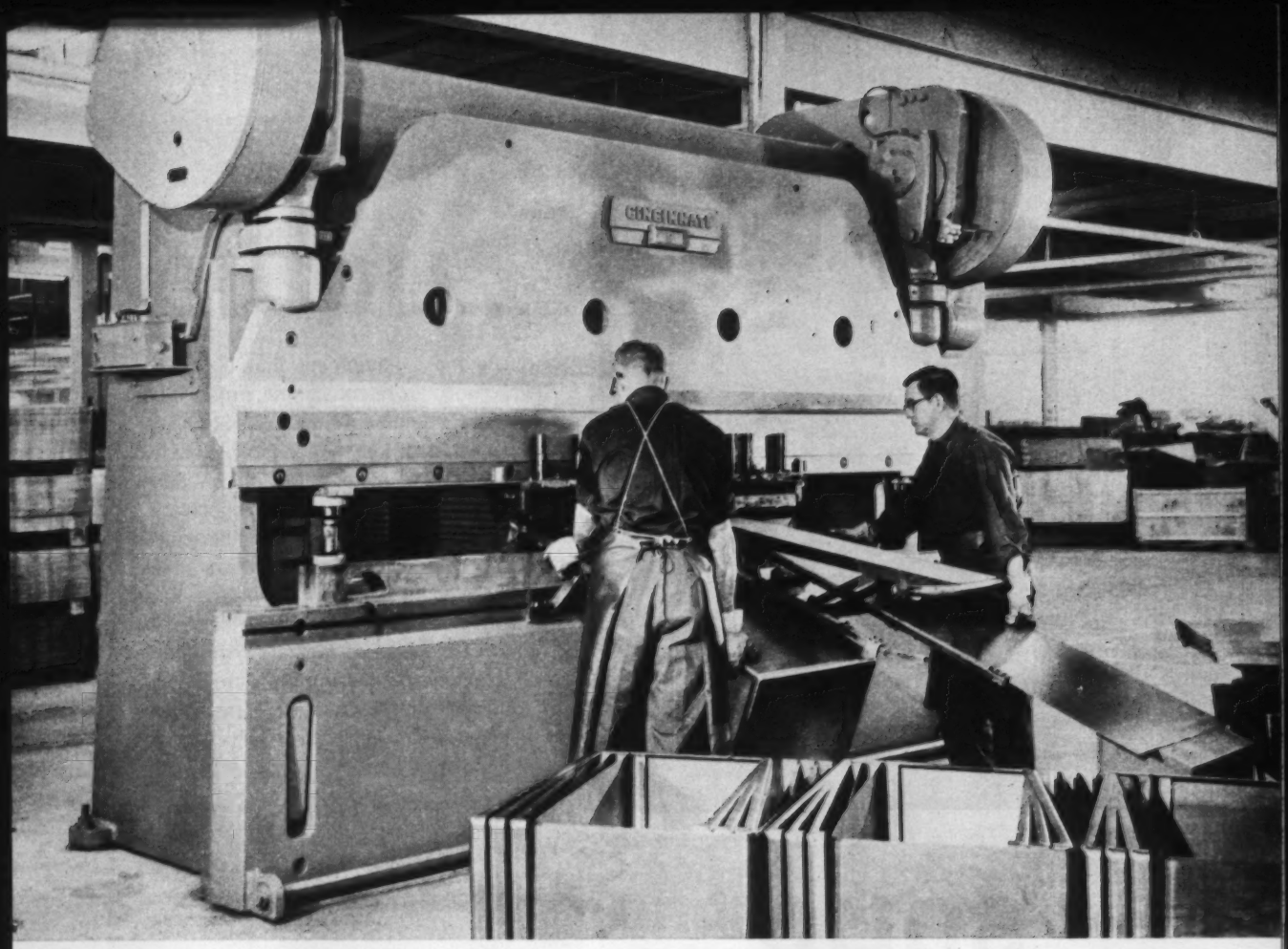
Full Range Electronic Positioning Select—allows positioning to be controlled manually or by tape. Tape program can be interrupted to insert additional or intermediate operations.

Controlled Programming—with automatic tape punch equipment, tapes may be prepared "on the machine" providing a permanent inspection record or a programmed tape for playback applications.

For complete details on the Series 600, or other modumatic control systems, contact your nearest Norden Representative—400 Main Street, East Hartford, Connecticut, JAckson 8-8411—11 West Ave., Dayton 2, Ohio, BAldwin 8-4481, or write to us at the address below.

NORDEN

DIVISION OF UNITED AIRCRAFT CORPORATION
DATA SYSTEMS DEPARTMENT
3501 HARBOR BOULEVARD, COSTA MESA, CALIFORNIA



Efficiency jumps 50%

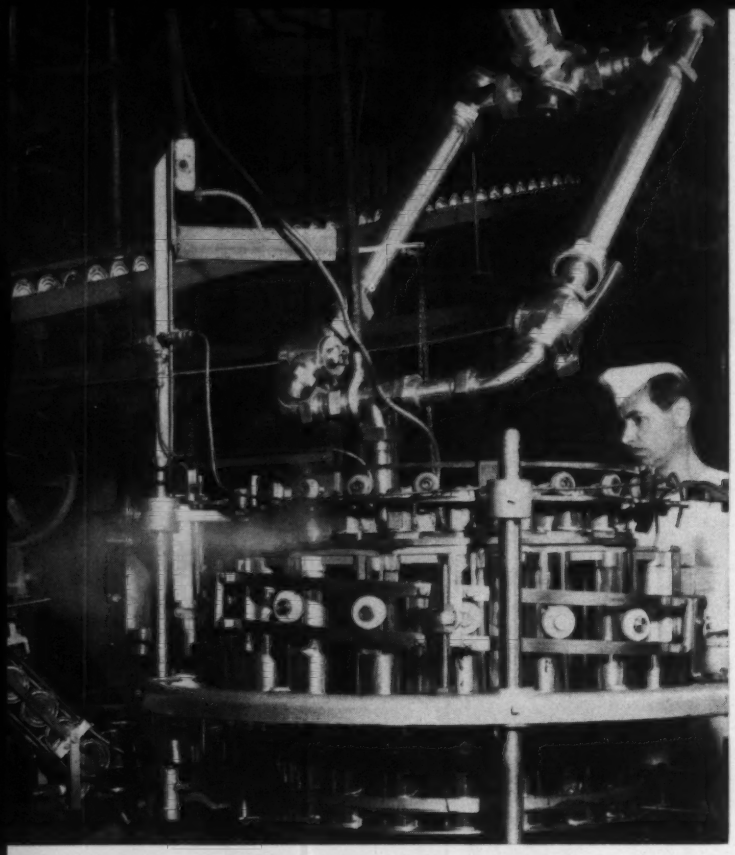
CINCINNATI® PRESS BRAKE FORMS PROFITS FOR STEELCASE

50% more efficient than previous method, this 225/150-ton Cincinnati forms four radius corners on pedestal bodies. "High degree of accuracy and convenient operation," according to Steelcase, help operators produce 80 pieces per hour. The machine operates more quietly and takes less floor space than their previous equipment.

THE CINCINNATI SHAPER CO.

Shapers / Shears / Press Brakes / Cincinnati 11, Ohio, U. S. A.

In Scotland: The Cincinnati Shaper Co., Ltd., Glasgow



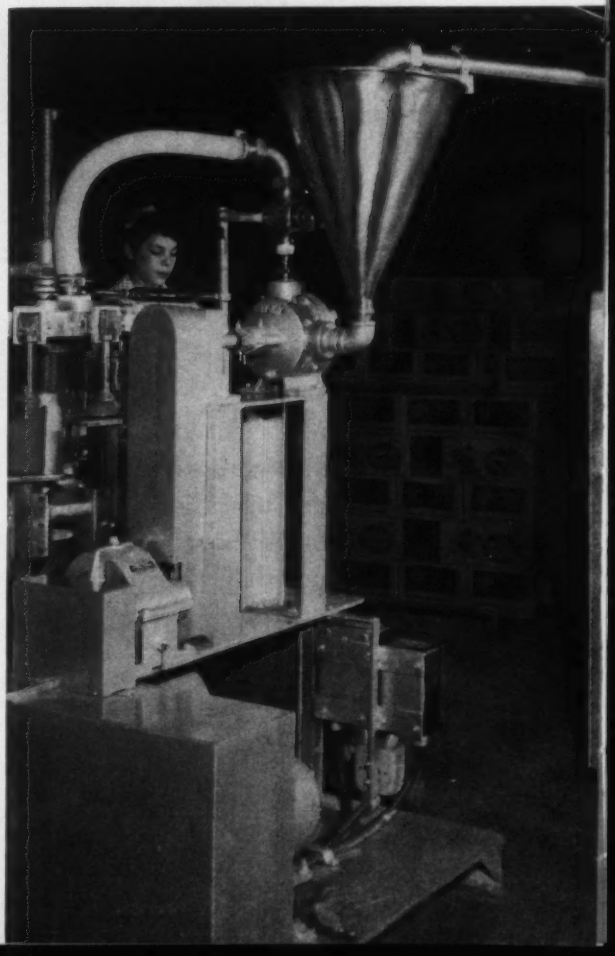
...LIQUID

If you make equipment that fills cans with chocolate or consomme, prune juice or pop, equipment made of Stainless Steel will do it fast, dependably, cleanly. The Votator* piston filler shown here happens to be filling cans with chocolate. Made of Stainless Steel, this filler can't harbor germs because Stainless Steel has a smooth, pocket-free surface. It is easily cleaned, too, so the strict standards of cleanliness that are mandatory in any food processing plant are easily maintained. Stainless Steel's resistance to corrosion makes it ideal for liquid applications.

**VOTATOR is a registered trademark of the Chemetron Corporation.*

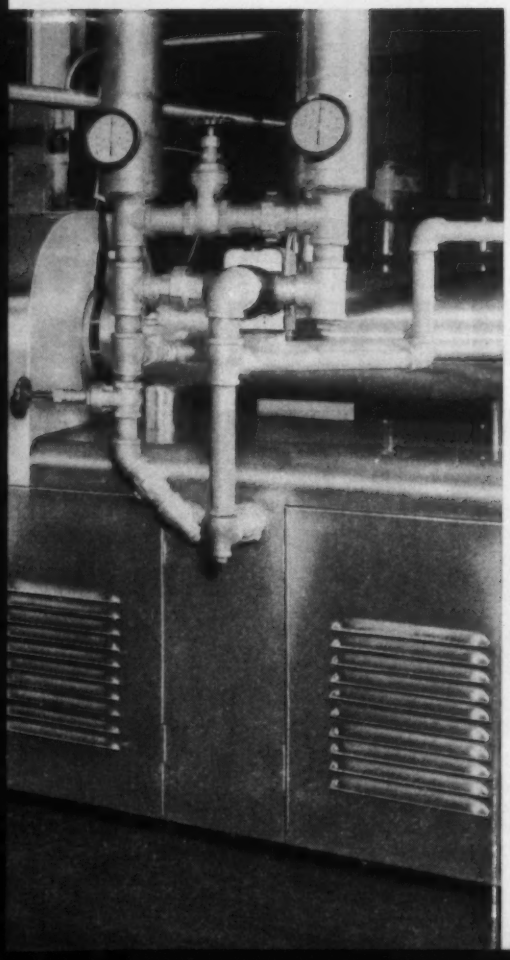
SOLID...

If you make equipment that processes solids like peanut butter or shortening, Stainless Steel can make your job easier and more profitable. This system makes peanut butter . . . and it makes it creamier. It takes whole peanuts in one end and grinds them, then Votator equipment heats them, cools them and turns out the finished product, ready for sandwich or cracker, at the other end. Here, Stainless Steel is used in the heads and shaft of the heat transfer area to assure maximum cleanliness. In a sealed unit like this one, corrosion could be a problem so Stainless Steel's inherent corrosion resistance is put to good advantage.



USS Stainless Steel . . . no other metal makes such a material difference in so many applications

This mark tells you a product is made of modern, dependable Steel.



...and in between

No material can match Stainless Steel's versatility. Stainless Steel offers designers and fabricators a unique combination of properties: superior strength, extraordinary corrosion resistance to an enormous variety of materials, outstanding properties at high temperatures, and attractive appearance. It is easily fabricated, and because Stainless Steel lasts longer, actually costs less in the long run.

For unmatched efficiency, durability, ultimate economy, specify Stainless Steels . . . no other metal makes such a material difference in so many applications.

If you have a selection or delivery problem, ask your USS representative or nearest Steel Service Center.

USS is a registered trademark

USS

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American Steel & Wire—Cleveland
National Tube—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
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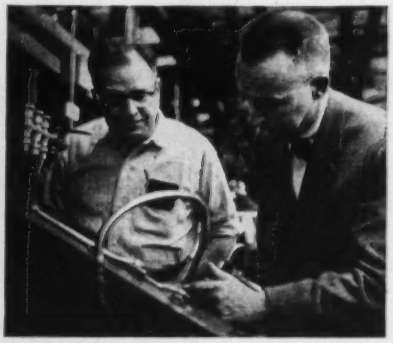
ALUMINUM • BRASS • COPPER • STAINLESS

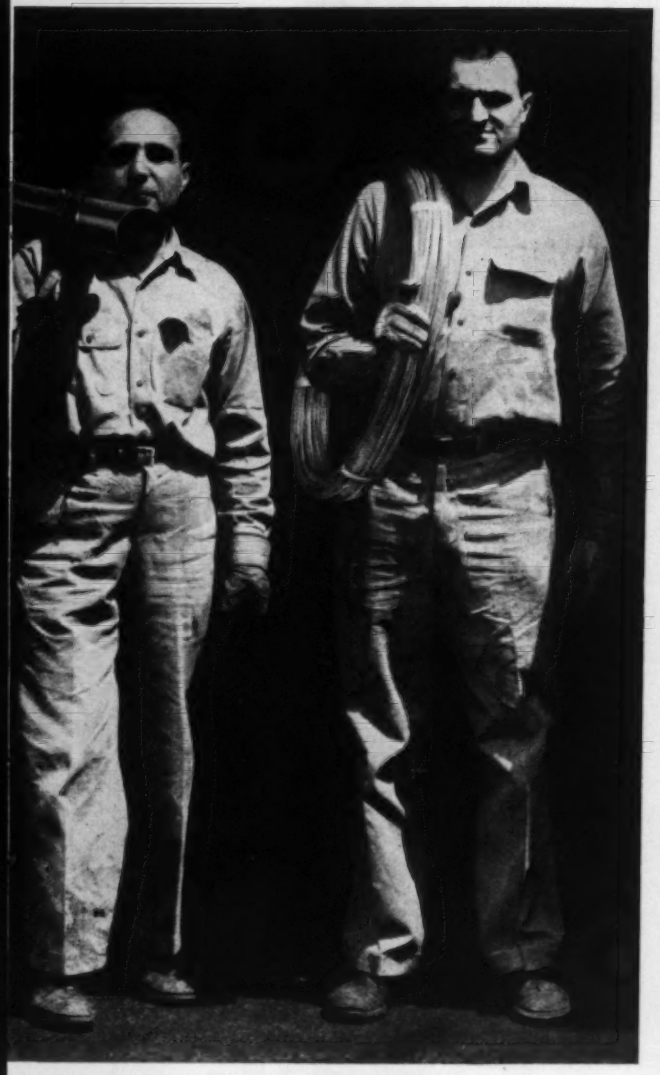
One phone call to Chase

ROD users! Investigate Chase 3-Mark Free-Cutting Brass. It runs at higher speeds, avoids costly jam-ups and mis-feeding. Uniform lengths facilitate multiple-feed operations with minimum scrap. Check coupon for details.

STRIP users! Special processing of Chase S-19 Brass Strip at the mill gives this metal finer, close-grain surface. Expert handling from mill to you protects it. Check coupon for more information about Chase strip.



WIRE users! There's a special service for you ...the expert assistance of the Chase Wire Service Man. He'll tell you which of the many wire alloys we make is best for what YOU make. To see him, check the coupon.



ALUMINUM BRASS·COPPER STAINLESS

Chase Multi-Metals Service Centers:

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Tel. PLaza 5-5731

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1315 Key Highway
Tel. PLaza 2-2565

BOSTON 4, MASS.
411 "D" Street
Tel. LIberty 2-0126

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222 S. Church St.
Tel. EDison 2-4152

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5401 W. Grand Ave.
Tel. TUxedo 9-4000

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222 Post Square
Tel. PArkway 1-3326

CLEVELAND 3, OHIO
4000 Chester Ave.
Tel. HEnderson 2-2300

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Tel. FLeetwood 7-8187

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5101 Colorado Blvd.
Tel. DUdley 8-2441

DETROIT 38, MICHIGAN
14480 Woodrow Wilson Ave.
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Mail the coupon at right for up-to-the-minute stock lists. And phone your next order for aluminum, brass, copper and stainless to the Chase Multi-Metals Service Center near you—for service no other company can match.

Chase

BRASS & COPPER CO. WATERBURY 20, CONN.
Subsidiary of *Kennecott Copper Corporation*

CHASE BRASS & COPPER CO.
DEPT. S-11, WATERBURY 20, CONN.

Please send me the following literature:

☐ Aluminum Stock List ☐ Stainless Steel Stock List ☐ S-19 Brass ☐ 3-Mark Free-Cutting Rod ☐ Mill Products Catalog

☐ *Please have Wire Service Man get in touch with me.*

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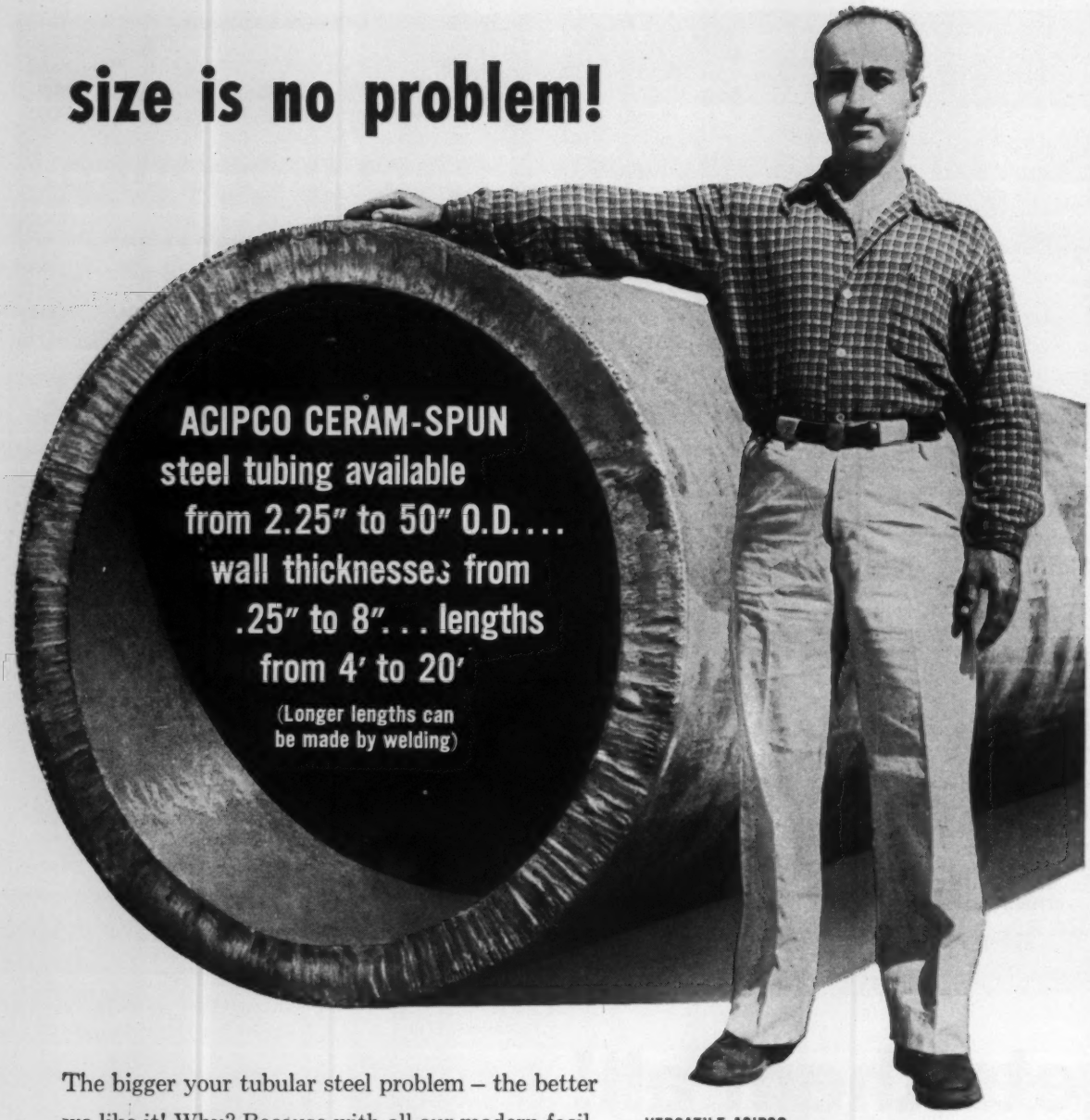


The bigger your tubular steel problem – the better we like it! Why? Because with all our modern facilities "under one roof," we are completely equipped to handle a variety of difficult jobs – expertly and economically! For expert consultation on centrifugally spun tube applications in your field... call on ACIPCO.

VERSATILE ACIPCO CENTRIFUGALLY SPUN STEEL TUBES

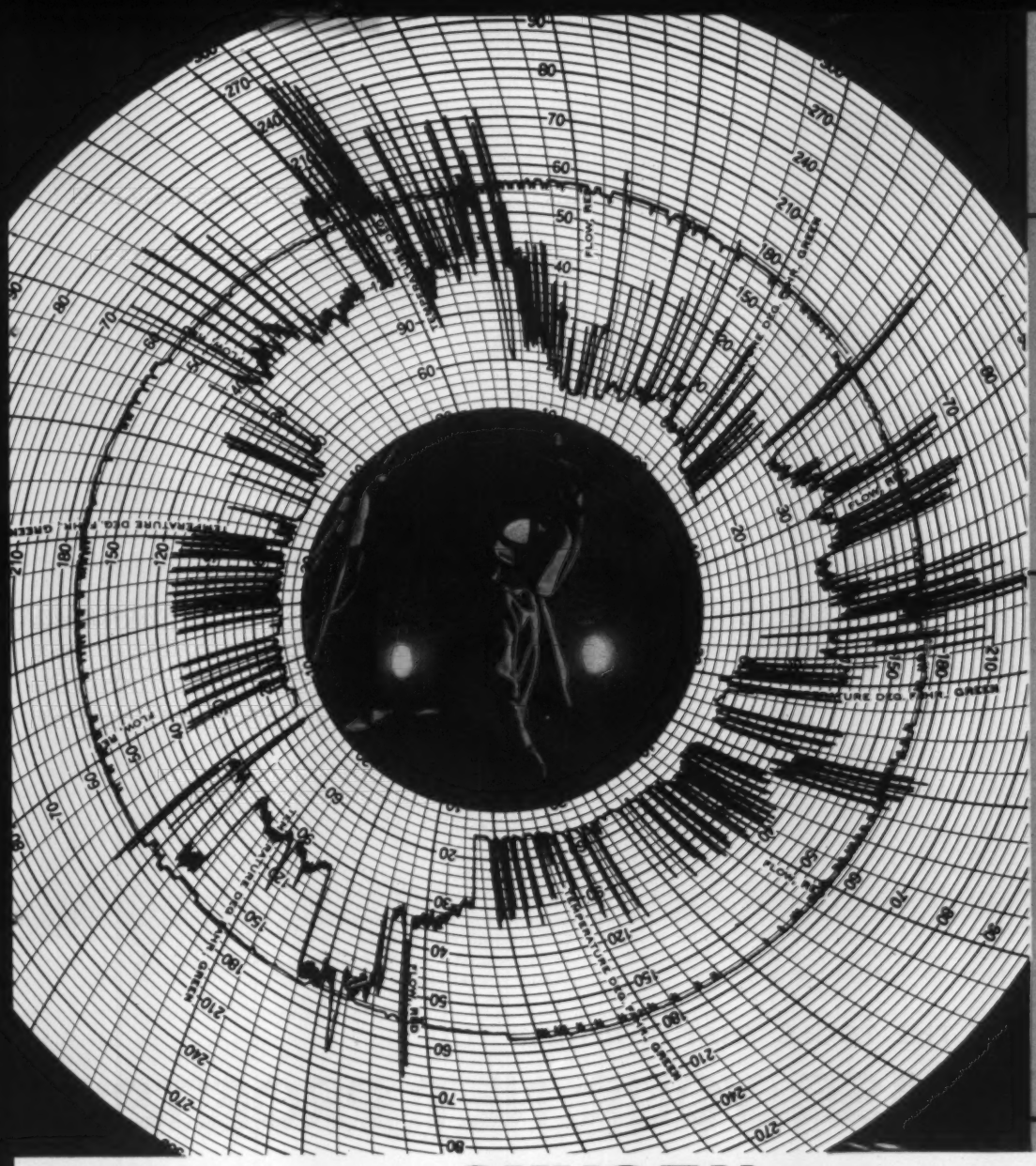
SIZE RANGES: Tubes are produced in lengths from 4' to 20'; longer lengths are made by welding. O.D.'s from 2.25" to 50" — wall thicknesses from .25" to 8".

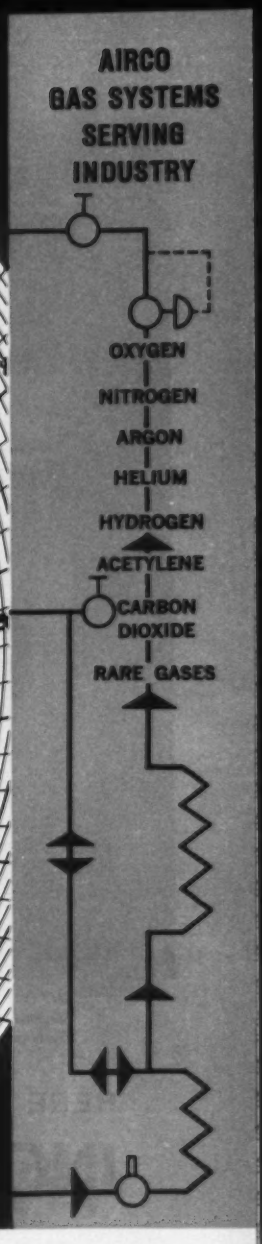
ANALYSES: All alloy grades in steel and cast iron, including heat and corrosion resistant stainless steels, plain carbon steel and special non-standard analyses.

FINISHES: As cast, rough machined, or finish machined, including honing and grinding. Complete welding and machine shop facilities are available.

Write for FREE Illustrated Catalog.

ACIPCO
SPECIAL PRODUCTS
DIVISION OF AMERICAN CAST IRON PIPE CO.
BIRMINGHAM • ALABAMA





OXYGEN...

in giant gulps or a steady flow...let an Airco on-site plant supply you

Looking for improvements in steel making? Airco built on-site plants supply users with plenty of oxygen . . . no matter how much you need.

This actual flow rate chart from a midwest mill pinpoints the story: this Airco on-site plant handles the surge demands right in stride. Whether flow rate demands are high or low, an on-site plant based on Airco gas experience is your assurance of high (99.5%) or low (95%) purity oxygen supplied with top efficiency.

Perhaps you also treat, cut, weld or scarf steel. All the more reason for Airco gas experience . . . and Airco gases! Ever since steel and industrial gases first got together Airco has been associated with improved processes.

For an on-site air separation plant . . . or a liquid storage station, bulk delivery or cylinder manifold system . . . call in Airco.

AIRCO®

AIR REDUCTION SALES COMPANY

A division of Air Reduction Company, Incorporated

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More than 700 Authorized Airco Distributors Coast to Coast

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Engineers! Air Reduction offers career opportunities. Contact Personnel Manager, New York.

MOVIE: "STOP LOSS WITH ORGANIZED LUBRICATION," a new 20-minute color-and-sound film created to show the opportunities for cost control through Organized Lubrication.

EDUCATIONAL FILM PACKAGE for plant departments consists of movies on greases, hydraulic oils, cutting oils, etc., that may be selected after seeing the "Stop Loss" film.

HERE ARE THE TOOLS THAT CAN HELP YOU

INCREASE YOUR NET PROFITS

Texaco's new "Stop Loss" program is designed to cut maintenance costs by modernizing lubrication practices. If yours is an average plant, the results can add 4 per cent to your net profit.

Even if your plant is an efficient operation, it is still virtually certain that there is an opportunity for cost control you are overlooking—either partially or completely. Here's what the Small Business Administration says in a recent publication:

Suppose there is an average plant, which sells $1,000,000 worth of goods per year. The net profit of this average company would be $73,400 and the maintenance cost would be $29,900. Now, suppose that by *better lubrication*, maintenance costs are reduced 10%, or $2990, *the $2990 will go directly into profit*—an increase of 4%.

A Texaco "Stop Loss" Program is designed for you. Texaco has developed a program specifically designed to help cut your maintenance costs via better lubrication practices. It will help you increase machine life, minimize downtime, reduce lube inventory, even cut purchasing costs. And the savings you make go directly into profits.

CO-ORDINATED BOOKLETS on the film subjects and others can be used as guides in specific areas.

TEXACO LUBRICATION CONTROL SYSTEM takes the guesswork out of your lubrication scheduling. It costs almost nothing to install, yet can add thousands of dollars a year to profits.

BY AS MUCH AS 4 PER CENT!

Can your plant pass this test? If the answer is "no" to any of the following questions, it is almost certain that a Texaco "Stop Loss" Program can improve your profit picture.

1. Is there a central source of responsibility in your plant for *all* lubrication? Yes ☐ No ☐
2. Can your machine operators devote all their time to production without worrying about lubrication? Yes ☐ No ☐
3. Is there any system for making sure that equipment gets lubricated in the right spots at the right time? Yes ☐ No ☐
4. Have you had a lubrication study made to eliminate costly duplication of lubricants? Yes ☐ No ☐
5. Are your oilers qualified men with knowledge of mechanisms lubricated? Yes ☐ No ☐

See for yourself how "Stop Loss" works! Texaco has just released a new color-and-sound movie to dramatize the benefits of good lubrication practices. It's called "Stop Loss through Organized Lubrication" and we think it would be valuable to you to see it. For a showing in your plant soon, mail in the coupon today!

Texaco Inc., 135 East 42nd Street, New York 17, N. Y.

MAKE YOUR RESERVATION TODAY!

TEXACO INC., Dept. S-162
135 East 42nd Street
New York 17, New York

I would like to see "Stop Loss through Organized Lubrication." Please call to arrange a showing in my plant.

Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State_____

TEXACO

Hand coiling of small spring orders is a skilled operation at The Yost Superior Co. in Springfield, Ohio. The company uses Johnson Music Spring Wire exclusively. Here, worker coils .012 wire into a compression spring with 16 coils having an O.D. of .196 inch. Small orders are filled overnight in this department.

Johnson Wire Speeds Overnight Delivery Of Handmade Springs

A spring maker who built a flourishing business by filling small orders practically overnight uses Johnson Steel & Wire Company's Music Spring Wire exclusively.

President L. V. Barnes of The Yost Superior Company, Springfield, Ohio, says flatly:

"Johnson Music Spring Wire is best." Since 1924, when a merger of Superior Spring Co. and Yost Gearless Motor Co. formed The Yost Superior Co., the firm has concentrated on producing custom-made springs and wire forms.

In one day recently, five telephoned orders for small lots of springs all specified the quickest possible delivery. "Three of those orders went out the same day and the other two were shipped the next morning," said William H. Craig, secretary-treasurer who heads production and purchasing activities.

Three factors are all-important to Yost Superior. They are:

• **Spring Making Skill** — Yost Superior's bonus incentive plan, the long tenure of its employes and its steady growth for more than a half-century all demonstrate the company has a skilled work force which knows and practices the art of spring making.

• **Sizable Inventory**—Large wire stocks, usually running around 500 tons, are always on hand in Yost Superior's stock room. Mr. Craig said. "Our customers depend on us to supply their needs quickly. That means large stocks of wire sizes commonly used." He added:

"Johnson Music Spring Wire is so good—consistently—that we feel confident in laying in a large supply. We don't worry about quality varying from coil to coil or shipment to shipment. We can depend on wire we buy today to match the properties and performance of wire we bought a year ago.

"When we order from Johnson,

Electronic gager on this Torrington W10A Coiler measures to .005 inch in determining whether each spring coiled is the proper length. Springs rejected by the gager are blown to the side while good springs fall into container. Spring being coiled is made of .010 inch Johnson Music Spring Wire. It has an O.D. of .121 to .126 inch and is 5/16 inch long. It takes 1,000 springs to weigh a quarter pound.

Coiling a long spring on a Torrington W12A coiler from Johnson .120-inch diameter Music Spring Wire. The 95 coils in this spring measure 30-1/2 inches in length. Each coil has an O.D. of 1-1/16 inches.

their wire is the best. One hundred percent testing of finished springs proves it.

"We're accustomed to holding the diameter of springs — and often spring lengths — to tolerances stated in thousandth's, so we've got to have good wire. Johnson Music Spring Wire helps us meet specs and its performance helps us meet load requirements."

While Yost Superior makes springs in large production runs for everything from grass seed spreaders to missiles and rockets, its Hand Department is a key operation.

In the Hand Department where orders for less than 100 springs or wire forms are filled, Johnson Music Spring Wire proves itself

Coiling springs by hand means high labor costs so it's important to keep them down to a minimum or the cost of making a few springs would go sky high. Here cost of the wire is insignificant but quality of the wire is most important.

• **Quality Comes Through** — That's because there's little or no time for experimenting or trial runs The Hand Department pays off because the spring maker knows his business and uses Johnson Steel Wire with its predictable performance qualities.

Yost Superior uses the full range of Johnson Music Spring Wire from .008 inch diameter up to 250 inch to make all kinds of compression, extension and torsion springs as well as a bewildering array of wire forms

That's a good recommendation for any spring maker. Whatever your needs for Music Spring Wire or any other fine wire specialty, you can count on Johnson Steel & Wire Co to give you the same consistent quality and good service which pleases Yost Superior.

You can get better wire and better products, starting today. Just call the nearest district sales office, listed here, and talk to a Johnson man who knows wire and production problems.

Grinding of spring ends on a Besly Grinder. These compression springs, made of .047 inch O.D. Johnson Music Spring Wire, are only 9/16 inch long and have an O.D. of 13/32 inch. On this machine, the closed ends are being ground square.

Coils of Johnson Music Spring Wire are delivered to the Coiling Department from Yost Superior's large stock room. The company normally carries an inventory of about 500 tons of wire.

we get quick delivery from warehouses in Akron or Chicago."

• **Good Raw Materials** — President Barnes said: "We demand the utmost in uniformity of diameters, finishes, tempers and physical properties. We get it from Johnson Steel & Wire Co.

"We don't have to ask for service. It's given us without asking. And Johnson Music Spring Wire has worked well for us. I would say

Johnson Steel & Wire Company, Inc.

Worcester 1, Massachusetts

a subsidiary of **Pittsburgh Steel Company**

Grant Building • Pittsburgh 30, Pa.

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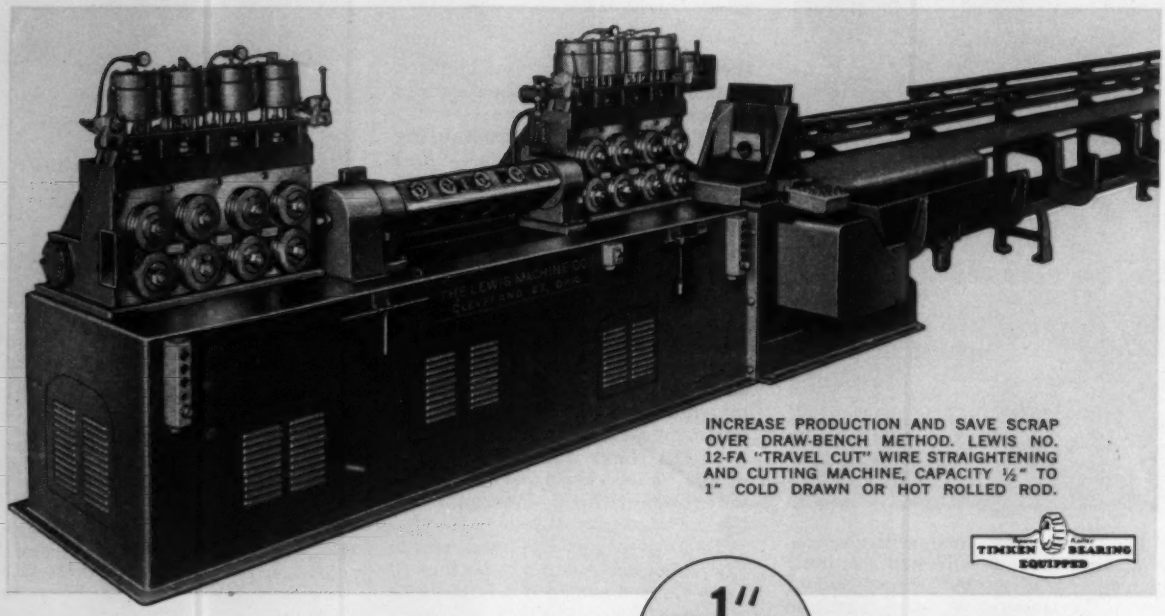
Akron Chicago Cleveland Dayton Detroit Houston Los Angeles New York Philadelphia Pittsburgh Tulsa Warren, Ohio



INCREASE PRODUCTION AND SAVE SCRAP OVER DRAW-BENCH METHOD. LEWIS NO. 12-FA "TRAVEL CUT" WIRE STRAIGHTENING AND CUTTING MACHINE, CAPACITY ½" TO 1" COLD DRAWN OR HOT ROLLED ROD.

TIMKEN BEARING EQUIPPED

Now...straighten and cut 1" dia. rod FROM COILS at speeds up to 350 fpm.

HERE'S WHY IT CAN BE DONE

CUT-OFF Flying Shear Type. Pure crank motion for both cutting and traveling permitting high speeds with minimum shock.

ROTARY ARBOR Two-speed with dual-center straightening dies for faster, more accurate straightening over a wide range.

ROLL HOUSINGS Dual-range pushbutton operated pneumatic feed pressure for exact feed control and coil end pull-through without twisting.

LENGTH GAUGING Light pressure on electric trip switch actuates air clutch. Wire is gauged and released with positive moving mechanism . . . springs and latches have been eliminated.

TRANSMISSION Positive sliding-gear type with eight feed speeds — 115 to 350 FPM.

Write for Brochure. Other models available to handle rounds from .012" to 1" dia. Shapes from 1/16 to 5/8" square, hex and flats.

THE LEWIS MACHINE COMPANY

A DIVISION OF CURTIS MFG. CO.

3441 EAST 76TH STREET • CLEVELAND 27, OHIO

SIGMATIC

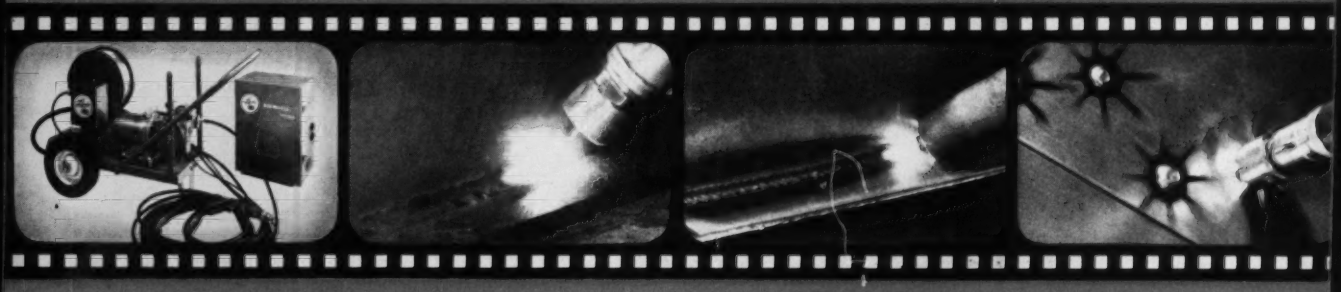
NEW ALL-IN-ONE "MIG" WELDING EQUIPMENT

Welding equipment is designed, developed and refined, but eventually it must be redesigned. LINDE'S new SIGMATIC line of "Mig" welding equipment is a product of this evolution... plus LINDE'S vast experience with more inert-gas and consumable-electrode processes than any other company in the world. The SIGMATIC line is the most-versatile semi-automatic equipment available anywhere—one machine for:

- **...all types of "Mig" welding—spray arc, short arc and spot welding**
- **...in all welding positions—vertical, overhead or downhand**
- **...with all shielding gases—argon, helium, CO_2, or their mixtures**
- **...and all wires—hard or soft, solid or tube**
- **...on all weldable metals—carbon steel, stainless, aluminum, magnesium, titanium**
- **...on all thicknesses—sheet metal and up**

See next page for details.

SIGMATIC



One SIGMATIC machine for... spray arc... short arc... spot welding

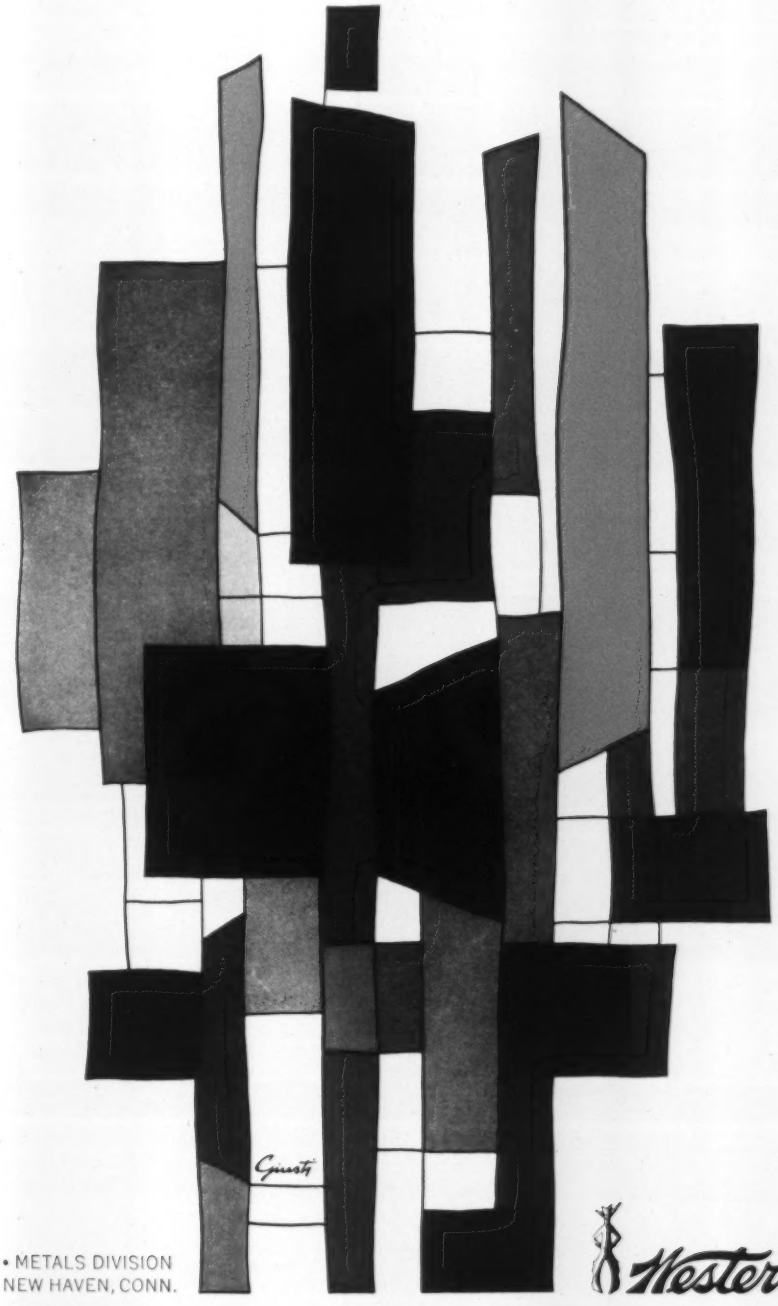
Spray arc, short arc, spot welding... never before combined in a single piece of equipment. SCC-8 control incorporates special spot-welding circuitry, featuring a directly-calibrated, precision weld timer and an independently-adjustable, "non-stick" timer. Converts from spot to continuous fusion welding at the flick of a switch. SEH-2 heavy-duty wire-feed unit—largest, most-rugged unit available today—permits positive feed of all "Mig" wire types, metals and diameters. The SIGMATIC line contains five basic units, designed with interchangeable parts permitting more than 50 combinations tailor-made to individual specifications. Available in cart-, sled- or bench-type units.

Unique controls are vastly simplified. All components are visible and accessible. Adjustments can be made with a screw driver. Only heavy-duty industrial-type parts are used throughout each unit to insure dependable, long-life performance with minimum maintenance. Top-quality parts—"Square D" pneumatic timers, Mallory electrolytic condensers, Cutler-Hammer switches, Potter & Brumfield relays, Electrons, Inc. thyratron tubes. The SIGMATIC line is unquestionably a major welding advance—with one rugged, durable machine, you can do any type of "Mig" welding in any position on any thickness of any metal. For more information or a live demonstration, call your nearest Linde office.

"Linde," "Sigmatic" and "Union Carbide" are registered trade marks of Union Carbide Corporation

LINDE COMPANY
UNION CARBIDE
Division of Union Carbide Corporation
270 Park Avenue, New York 17, N.Y.

You'll get modern styling, ageless appeal, with Western Brass... for the enduring glow of solid brass adds a classic note to contemporary design... keeps any design forever young and beautiful. That glow is kindled at Western Brass by meticulous finishing and packing methods, unexcelled in the industry. Moreover, this precision finishing, customers say, actually gives more parts per pound of sheet or strip. You'll make it better with beauty-rich brass. You'll make it best with "tailor-made" Western Brass.



OLIN MATHIESON • METALS DIVISION
EAST ALTON, ILL., NEW HAVEN, CONN.

Western BRASS

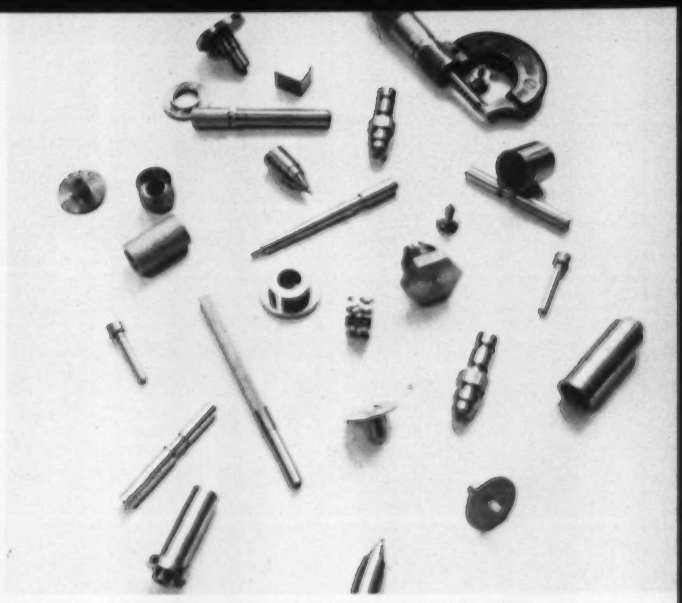
Gulfcut® 45A oil cuts machining time almost in half, permits

GULF MAKES THINGS

Trouble! The Millar and Frey Screw Machine Products Company, Union, New Jersey, found plenty when it recently contracted to produce a small machined steel part. Specifications called for drilling a deep, blind hole — perfectly flat at the bottom. They also required a hole sidewall that forms perfect right angles to the bottom. Close sidewall tolerances. And a fine finish—with no burrs left in the hole. To handle these machining requirements, Millar and Frey tried six different cutting oils. All failed.

And then, the company tried Gulfcut 45A—a highly compounded sulfo-chlorinated-lard oil. The results: Not only were the requirements met, but Gulfcut 45A enabled Millar and Frey to increase speeds and feeds 48 percent, and slash machining time from 34 to 18 seconds.

In addition, Millar and Frey stepped up the production of a small tellurium copper component with Gulfcut 45A. Edmund Frey, one of three partners, says, "Now, we're machining tellurium copper at brass speeds. Our tools



Round up. Typical parts machined by Miller and Frey Screw Machine Products Company. Gulfcut 45A is used on 75 percent of all machining jobs.

Left to right, Edmund Frey, J. H. Schindler, Gulf Sales Engineer, and Robert Millar. Both partners agree that Gulfcut 45A gives top performance.

Tellurium copper component. It's being machined at brass speeds, thanks to Gulfcut 45A.

48% increase in feeds and speeds . . .

RUN BETTER!

last longer. Gulfcut 45A doesn't stain or discolor the working piece either."

Today, Millar and Frey use Gulfcut 45A on 75 percent of their machining jobs. Ed Frey tells why: "This oil is the most efficient, all-round cutting oil I've ever used."

If you've got a machining problem, try the Gulfcut line. See for yourself why Gulf makes things run better! Just call a Gulf Sales Engineer at your nearest Gulf office. Or, write for illustrated literature.

GULF OIL CORPORATION
Dept. DM, Gulf Building
Houston 2, Texas

GULF

SP-9886

18 lbs. of stainless per ring eliminated by flash butt-welding extruded sections

Amweld experience in forming and flash butt-welding rings from extruded sections reduced the cost of $52.00 rings to $21.00 each. A special section closely approximating the cross-section of the finished part was selected to replace heavy rectangular bar stock. By leaving over 12,000 lbs. at the mill, the cost of these rings was reduced by 40%—not to mention large savings in machining time.

Amweld is equipped to supply flash butt-welded rings and circular products in stainless, titanium, aluminum, as well as a wide variety of corrosion-resistant alloys. If you would like to know more about Amweld's welding, fabricating and machining facilities, phone or write.

GET THE FACTS ABOUT AMWELD

New 20-page catalog describes flash butt-welded rings and circular products manufactured by Amweld. Also booklet entitled, "How Flash Butt-Welded Rings are Made."

AMWELD® INDUSTRIAL PRODUCTS

THE AMERICAN WELDING & MFG. CO. • 110 DIETZ ROAD • WARREN, OHIO

Steel Exports Dip as Imports Recover

Steel exports dropped sharply in September to the lowest level since March. Imports rose to the highest point since June, reports the Iron & Steel Division of the Business & Defense Services Administration.

EXPORTS

	(Thousands net tons) 1959	1960
September	60	226
August	64	328
July	176	331
June	212	382
May	183	320
April	196	235
March	193	203

IMPORTS

	(Thousands net tons) 1959	1960
September	366	207
August	324	184
July	430	177
June	410	213

Voters O.K.'d More than $3 Billion in Bond Issues

Voters provided an important stimulus to the economy by approving $3 billion in state bond issues. The largest issue was passed in California—a $1.7 billion water bond plan. The money will finance construction of a water supply system including dams and aqueducts. Other states authorized large issues for land purchases, improving universities and hospitals, and housing construction: Illinois, $345 million; Oregon, $182.5 million; New York, $83 million; Rhode Island, $10.2 million; New Mexico, $8 million.

Foreign Competition Will Get Tougher

International competition for the Free World's market will increase enormously within ten years, believes H. B. McCoy, president, Trade Relations Council. "Such competition," he adds, "will be more intense on materials and products now on the market and will subsequently embrace more industries and more products of each industry." He also says he does not believe that we can expand our exports fast enough to keep our deficit in the balance of payments within tolerable limits.

Imitation Is Sincerest Form of Flattery

Promotion of your product should begin at home. Peter Muller-Munk, Pittsburgh industrial designer reports some steel company executives use wooden desks. He recommends a change to executive-type steel desks.

Watch Yule Spending for Clue to 1961 Business

How shoppers buy as the holidays draw closer will determine how well the national economy thrives, says the National Association of Credit Manage-

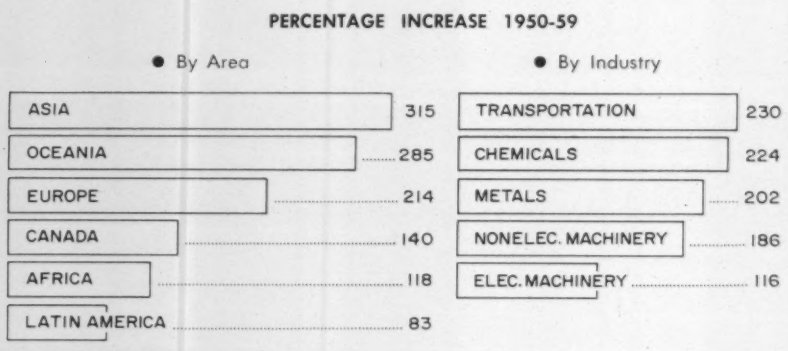
ment. If holiday trade is as good as or better than last year's (as merchants expect), our economy will be in a strong position to move ahead in the new year. If trade is under that pace, business will remain slack. The association sees no sign of a vigorous advance in the next six months, but long range prospects are bright.

New Products Will Pace Consumer Electronics Expansion

Consumer electronics are on the threshold of a new era of product development and expansion, says Edward R. Taylor, executive vice president, Motorola Inc., Chicago. But even if nothing new materializes, he predicts that in the next five years television sales will jump by 2 million units; radios 4.3 million; stereo outfits 2.5 million. A look at the future: Household computers will punch card systems for automatic preparation of meals.

U. S. Increases Investments Abroad

U. S. investments in manufacturing operations abroad totaled $9.7 billion at the end of 1959, an increase of $5.9 billion since 1950. Canada has the largest share (47 per cent) and Europe follows (30 per cent).



Source: Department of Commerce.

Ireland Woos Foreign Manufacturers

Through cash grants and tax exemption incentives, the Irish government has brought 90 new industries to Ireland in the last three years. Most of the firms—U. S., German, Dutch, British, Japanese—manufacture for export. U. S. firms in Ireland generally key their products to Europe and the sterling area countries.

Federal Reserve Reverses Stand on Silence

Look for the Federal Reserve System to give the public fuller explanations of important credit policy moves in the future. Recent example: The FRB announced that it has provided an additional $1.3 billion to the commercial banking system to supply cash and credit needs for the coming holiday season.

Skimpy Executive Bonuses May Spur Job Hopping

Some top brass in industry may switch jobs at the turn of the year, warns Lon D. Barton, president, Cadillac Associates, Chicago, an executive recruiting firm. He says they've already made the decision and are only waiting

around to collect yearend compensation. Mr. Barton suggests: The exodus may be stemmed by making bonuses as liberal as possible. These people are dissatisfied because they anticipate a small bonus, override, yearend settlement, or raise. He also has a countersuggestion: A modest bonus can be a subtle way of giving an incompetent man his walking papers.

Jets Bring Innovation

Designed to serve the Jet Age, this ramp, called Jetway, provides passengers with weather protection and eliminates climbing when boarding. It operates like a telescope; connected sections slide in and out to span the distance between the terminal and the aircraft. The unit is self-propelled and capable of expanding from 54 to 107 ft, and it can be raised or lowered. P-I Steel Corp., Los Angeles, a division of Stanray Corp., developed the ramp.

Ford Seeks Full Ownership of English Subsidiary

Ford Motor Co. is making a bid to buy up the remaining stock of Ford Motor Ltd., England. Offer: $20.50 per share, or a total of $363.4 million. The automaker already owns 54.6 per cent of the stock. Another 17.7 million shares are held by British stockholders.

Push on to Develop Fresh Water Production Plants

The first of a series of demonstration plants for the production of fresh water from salt or brackish water has been selected, reports Secretary of the Interior Fred A. Seaton. The 1-million-gallon-per-day plant will use a multiple-effect distillation process for saline water conversion. Plans call for at least five demonstration plants in the East, West, Gulf Coast, and the Northern Great Plains.

Three-Man Circumlunar Orbit Planned

Going one step beyond Project Mercury, the U. S. plans to put three men into orbit around the moon and bring them back to earth. Deadline: 1968. The vehicle, called Apollo, will have the maneuverability the Mercury capsule lacks. Research & Advance Development Div., Avco Corp., is working on the project.

Plastics Push Harder for Auto Market

The auto industry will save $100 million annually by 1970 if it continues its present rate of growth in the use of plastics, asserts W. T. Cruse, executive vice president, Society of the Plastics Industry. He looks for autodom to consume 500 million lb of plastics yearly by 1970. The average 1961 auto uses about 22 lb of plastics, which replace 150 lb of metal, Mr. Cruse says. Plastic parts are used in engines, transmissions, chassis, electrical systems,

bodies, trim, and accessories. SPI suggests future uses ranging from entire hood and floor sections to illuminated plastic front grilles, carburetors, and hardware.

Lower Borrowing Rates Expected

The supply of capital for commercial and industrial mortgages is greater today than it was six months ago, reports the National Association of Real Estate Boards. Weak demand for loans in relation to the supply of funds may press borrowers' costs downward during the next few months.

Executive Sees Upturn in 1961 Housing Starts

"The housing market has taken a turn for the better," says James R. Price, chairman, National Homes Corp., Lafayette, Ind. Reasons cited: Buyer confidence is returning; most financing has eased off; the inventory of unsold homes has been reduced. Biggest prospects are second-time buyers looking for more space and luxury features.

Steel Imports Hit by Southern Building Codes

The South has turned to protectionism in a campaign started by the Southern Building Code Congress. More than 900 municipalities have erected barriers against the use of imported steel in construction via tight building code regulations.

Straws in the Wind

Unemployment failed to drop seasonally in October, and Labor Department officials expect to see the jobless total hit 5.2 million by January if the economy doesn't improve. . . . Engineering demand continues strong. Deutsch & Shea Inc., technical manpower consultant, reports a recent 10 per cent increase in demand. . . . The Ensley (Ala.) rail mill of the U. S. Steel Corp.'s Tennessee Coal & Iron Div. goes back into operation Nov. 20 after being closed since August. . . . Aluminum Co. of America reduced its price on aluminum sheets for can manufacture by 0.3 cent, following Kaiser Aluminum & Chemical Corp.'s cut of last summer. New price: 32.2 cents per pound.

Metalworking Pulse

The Business Trend: The preliminary 150 index figure (right) represents the second straight decline. Blamed: Steel, carloadings. **Autos:** Passenger car output, still near the late October level, is expected to be cut back this month. Truck outturn is rising following introduction of new models. **Steel:** With production holding at about 1.4 million tons a week, operations are only slightly above the year's low, set in July.

- **INDUSTRIAL PRODUCTION**
  Week ended Nov. 12 . . **150†**
  Year ago **134**
  Details on Page 75

- **PASSENGER CAR PRODUCTION**
  Week ended Nov. 19 . **140,000***
  Year ago **68,476**
  Details on Page 72

- **INGOT PRODUCTION RATE**
  Week ended Nov. 20 . **51.4%†**
  Week ago **51.5%**
  Details on Page 140

†Preliminary. *Estimated

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...and discover how to separate fact from opinion in the news

HERE ARE THE KINDS OF VITAL QUESTIONS NEWSWEEK ANSWERS EVERY WEEK . . .

- How can you finance your child's complete college education?
- What big breakthroughs are near in the treatment of cancer? Crippling arthritis? Cerebral palsy?
- What is the mood on Wall Street now?
- Is a big "buyer's market" in housing coming up?
- What amazing new atomic devices are American scientists developing?
- What's the short-range, long-range, outlook for business? For employment?
- Is there any truth in the talk of a deep 1961 recession? Which areas should you watch closely for trends?
- What crucial problems will the new administration act on first?
- What's best in new books, movies, plays, TV shows?
- What are the Russians up to? Are they trying to wreck the U.N.?
- How will small nations use their new bloc power in the U.N.?
- Will Congressional probes bring down drug prices?
- Are our overseas bases now obsolete?
- Big cars; compact cars; used cars: Which are the best buys?

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In Newsweek you read both news and signed opinion. You get all the facts, then decide for yourself on questions of importance to you. Should you buy a new home now? Is this the time to invest? Branch out now or later in business or career? Which issues will affect taxes, education, construction, jobs – and how? You get all the facts, all the opinions, and then determine the answers for yourself.

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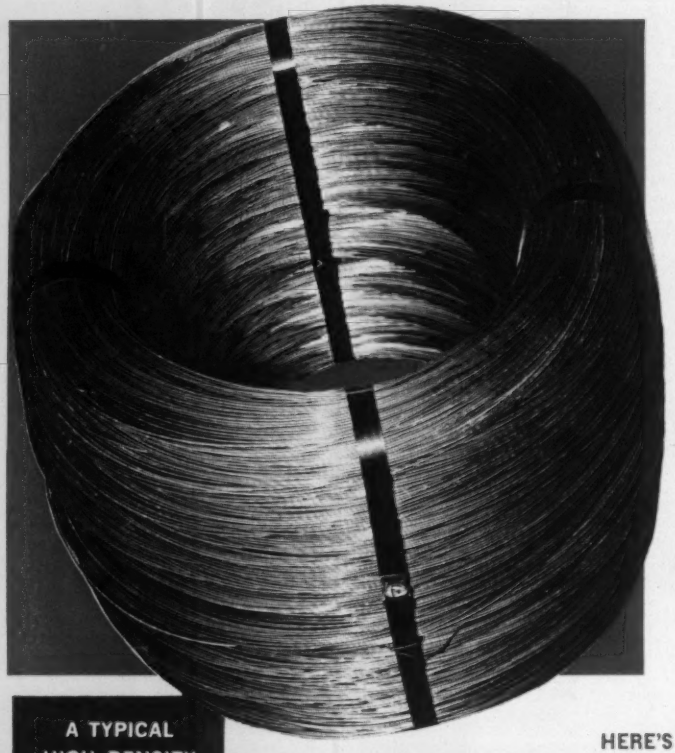


Non-productive coil-change downtime and coil-remnant scrap losses "pirate" profits from fabricators who still have the "CMB"—*conventional mill bundle*—habit . . . Users who have switched to *LPR's find they can feed up to 28 times more wire per set-up—*in single length run*—eliminating up to 95% of production stoppages due to coil changes; reducing downtime and coil-remnant scrap in direct ratio.

*LPR users experience other money-saving benefits too . . . loading time cut, overall man-hour costs reduced, storage space diminished, productivity increased . . . in fact, *each *LPR coil is a self-contained, cost-reducing, materials expediting system.*

To learn more about how *LPR's can help you save wireworking time and money, call your nearest DSC customer "Rep" or write Detroit Steel Corporation, Box 7508, Detroit 9, Mich.

A TYPICAL HIGH DENSITY * LPR COIL

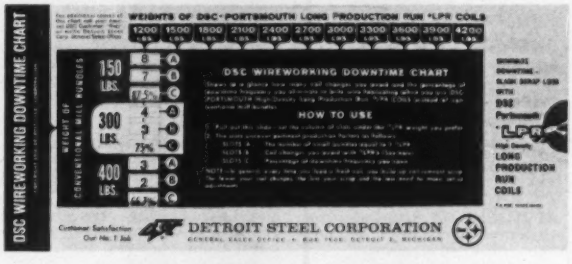
10 gauge, 2,210 lbs., —more than 8 miles of non-stop fabrication.

* LPR's can give you up to 40 miles of non-stop fabricating, depending on wire size.

FREE

Send for your free copy of this new DSC Wireworking Downtime Slide Chart. It gives you, at a glance, percentage of downtime frequency you eliminate by using *LPR coils instead of 150, 300 and 400 lb. bundles. Please request, on company letterhead, from Detroit Steel Corp., Box 7508, (Room 311), Detroit 9, Mich.

HERE'S A NOVEL WAY TO "FIGURE" DOWNTIME SAVINGS


DSC WIREWORKING DOWNTIME CHART
WEIGHTS OF DSC-PORTSMOUTH LONG PRODUCTION RUN *LPR COILS
1200 1500 1800 2100 2400 2700 3000 2300 3600 3900 4200
DSC WIREWORKING DOWNTIME CHART
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U. S. Goes International!

U. S. industry is going international at a breathtaking pace.

It is thinking and planning internationally.

Its executives take off in a DC-8 or a Boeing 707 for Tokyo, Johannesburg, Paris, or Rio as nonchalantly as they traveled from Chicago to Detroit in a DC-3 a few years ago.

It is tailoring its products to the needs of overseas consumers.

It is investing $1.3 billion this year in foreign plants.

It is learning how to compete more effectively with imports here at home.

The auto industry, for instance, is stemming the tide of imports with a dozen compacts, and it has a couple of midget cars on the way. Other industries are taking similar steps.

What all industry is experiencing is another industrial revolution that will have greater political and economic impact on the world than the one that started in England late in the 18th Century.

The old colonial empires are being replaced by a host of new nations.

In Africa, Latin America, and elsewhere, the drive is on to build up home industry and trade with other nations.

In Europe, the Common Market (France, Germany, Italy, Belgium, Holland, Luxembourg) comprises a marketing area with 165 million people, almost as large as our own.

The Outer Seven (England, Sweden, Norway, Denmark, Portugal, Austria, Switzerland) have about 100 million.

Those countries, joined in large economic units, can benefit fully from specialized production and the application of automation to mass production.

Further industrialization and higher standards of living abroad can mean more—not less—business for U. S. companies.

Exports have risen from a low annual rate of about $15.5 billion early in 1959 to $20 billion in 1960—a pace equaled only in 1956 and 1957, when oil shipments skyrocketed during the Suez crisis.

Imports have eased from $15.2 billion in 1959 to slightly less than $15 billion.

Our $5 billion balance of trade in 1960 will be one of the largest ever reported.

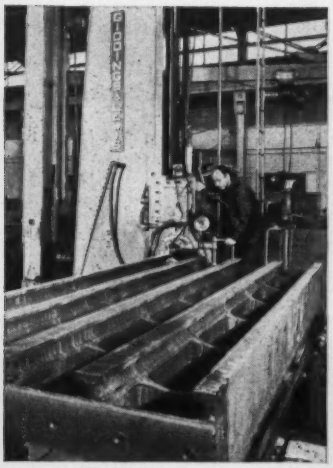
However, don't be deceived by those favorable statistics.

Even though industry is going international, the arduous job of readjusting to changing world competitive conditions is just beginning.

We hope your company is keeping up!

Irwin H. Such

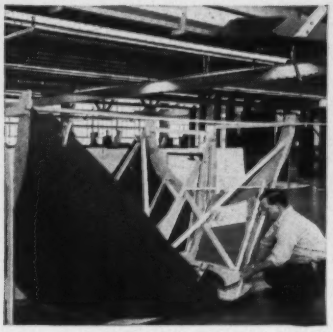
EDITOR-IN-CHIEF



Reversible center section for 13 foot, 2 inch wide pallet being machined on horizontal boring mill. End section must be held to close tolerances to receive axles, which are pressed into place.

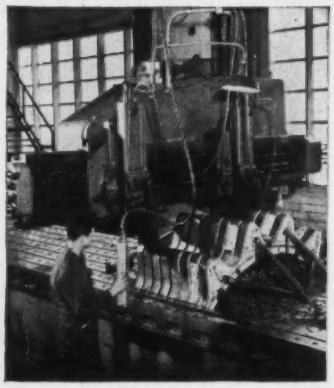
Wheel body for pallet drive on 26-foot vertical boring mill. The edge to which gear teeth are to be attached has already been machined, and the drive shaft hub is being bored.

A pre-installation test of circular sinter cooler in Dravo's Neville Island yards. Method of dumping the pans can be seen at the right rear. This particular feature of the Dravo-Lurgi cooler prevents excessive sinter breakup.



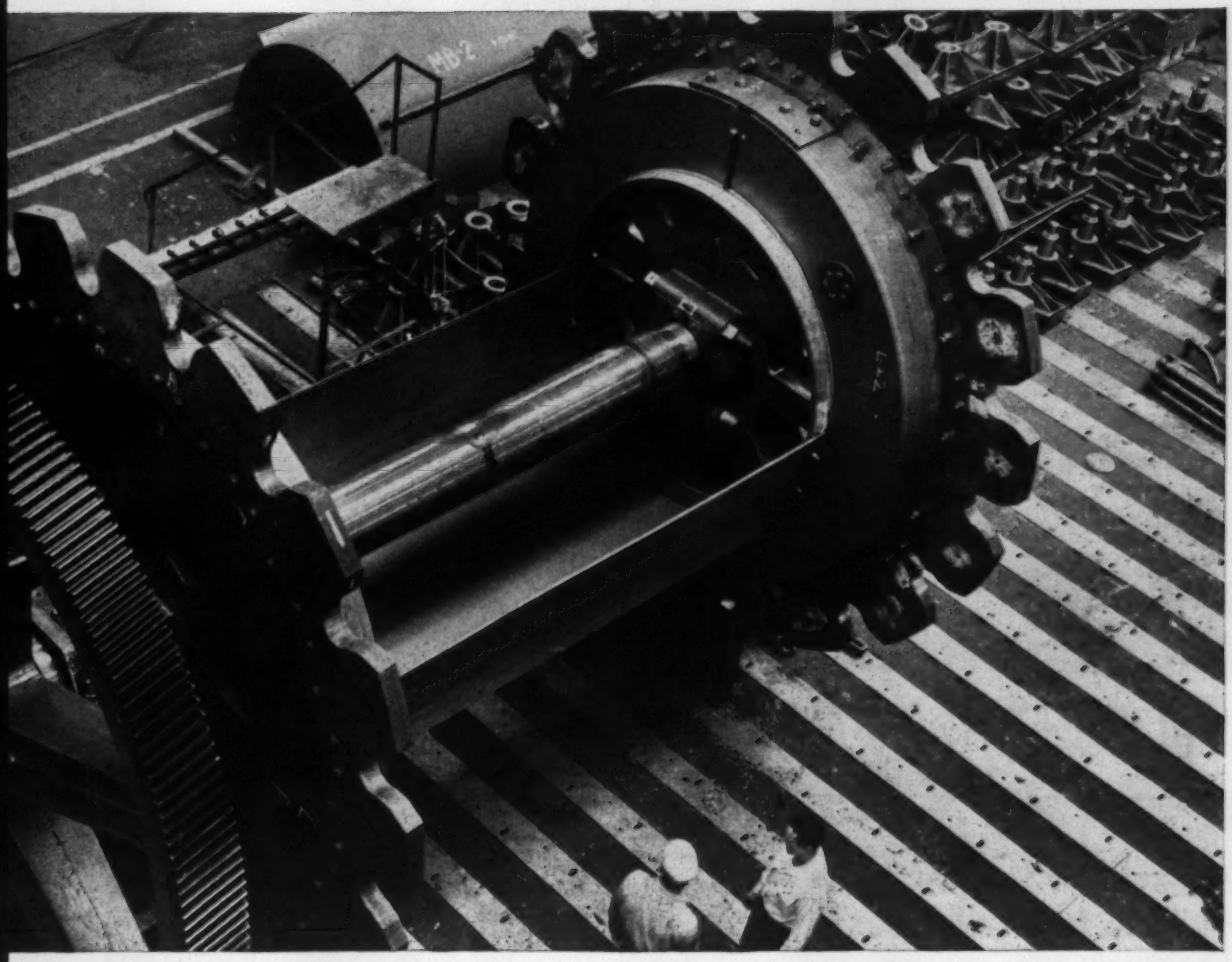
Full size mock-up of duct work for a sinter cooler in Dravo's mold loft. This model will provide templates for actual fabrication.

Dravo machinist operates 26-foot bed planer which is machining a full set of sprocket teeth. This method gives rigid control of uniformity for a perfect fit.



Pre-assembly of main drive for world's largest sinter machine in Dravo's Neville Island shops. All dimensions are carefully checked in this operation. Note partially assembled torque tube, a design feature which maintains accurate sprocket tooth alignment.

HOW DRAVO BUILDS SINTER MACHINES

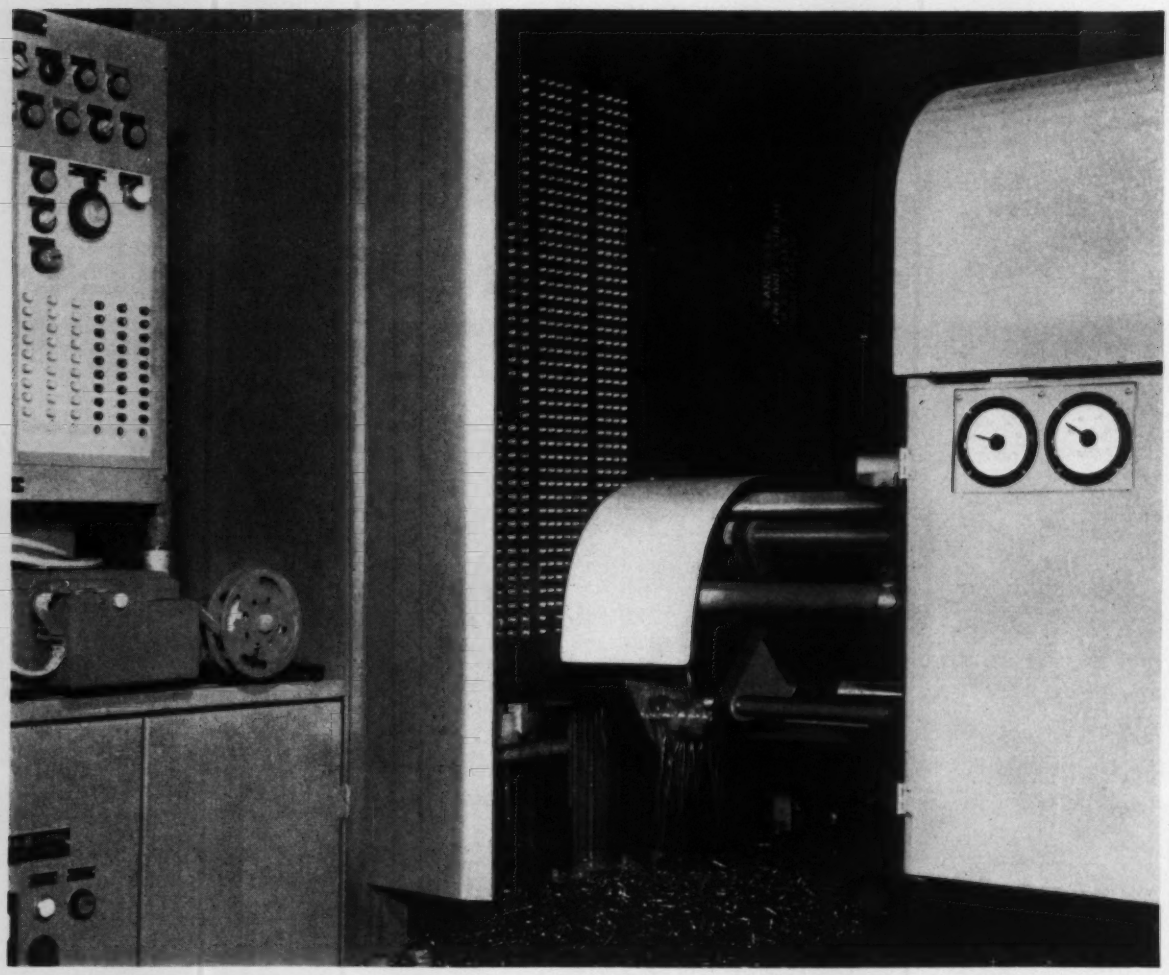


Research and design begin the process. At Dravo's Research Center, sintering characteristics of ores to be used are determined . . . these form the basis for the final design. Through an exclusive licensing agreement with the Lurgi Company, Dravo incorporates sinter machine features developed by Lurgi modified to suit American standards.

Next comes fabrication of the machine itself, precision built in Dravo's own shops. And, finally, the erection of the complete facility.

This kind of single responsibility, including research, fabrication and engineering-construction, produces sinter plants that perform to specifications—on time. For complete information, write or phone Dravo Corporation, Pittsburgh 22, Pennsylvania.

DRAVO
CORPORATION



"40 IPM AT 875 RPM... WE WERE AMAZED"/ *says Walter P. Hill*

DATA:	1020 LEDLOY LEADED PLATE 1½" THICK	1020 NON-LEADED PLATE 1½" THICK
PENETRATION RATE Production Run	40 IPM	20 IPM
DRILL SPEED Production Run	875 RPM	750 RPM
MAXIMUM IPM Test Run	up to 47	up to 28
CHIP CHARACTERISTICS Thickness Temperature Type	.060—.080 cool broken	.040—.060 cool curled

"Ours is a specially designed numerically controlled jig drilling machine with which we obtained penetration rates of 20 Inches Per Minute at 750 RPM in standard half-inch thick 1020 steel plate. However, with the same set-up, we easily obtained 40 IPM at 875 RPM in INLAND LEDLOY leaded steel plate three times as thick and with far better tool life.

■ "Actually, in LEDLOY, we reached penetration rates of 46 and 47 IPM but consider the 40 IPM more practical for production runs. Our programmed test run was made on steady plates for large condensors in which 1½" LEDLOY steel plates were used. As a control, equivalent drillings were made in non-leaded plates of the same chemistry and the same thickness. Our load meter showed the same pulled load on LEDLOY at 40 IPM as we pulled on the non-leaded plate at 20 IPM. Tool life using LEDLOY plates at 40 IPM was equal to tool life using non-leaded plates at only 20 IPM.

■ "We conclude, and without hesitation state, that LEDLOY displayed a marked improvement."

Walter P. Hill, President
WALTER P. HILL, INC.
DESIGNERS AND BUILDERS
SPECIAL AUTOMATED MACHINES
DETROIT, MICHIGAN

LEDLOY®
the world's most machinable steels

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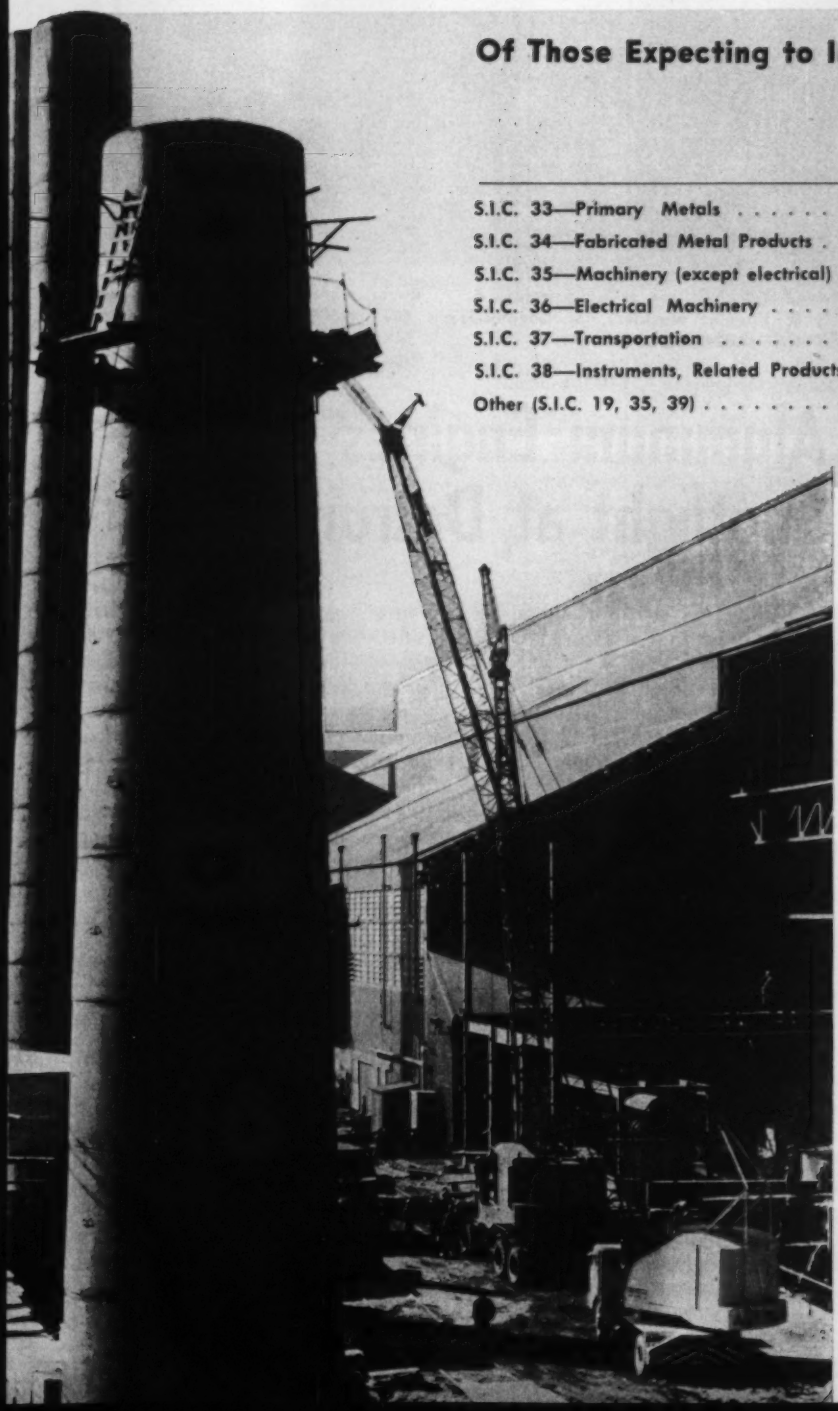
36% of Metalworking Plants Will Hike Capacity in '61



Of Those Expecting to Increase Capacity:

	14.8% WILL BUILD NEW PLANTS	26.6% WILL BUILD ADDITIONS	57.5% WILL BUY EQUIPMENT
S.I.C. 33—Primary Metals	22%	24.7%	57.8%
S.I.C. 34—Fabricated Metal Products	10.3%	26.5%	59.1%
S.I.C. 35—Machinery (except electrical)	6.2%	29.6%	62.1%
S.I.C. 36—Electrical Machinery	18.5%	25.6%	46.5%
S.I.C. 37—Transportation	21.7%	31.8%	65.6%
S.I.C. 38—Instruments, Related Products	30.9%	34.1%	65.5%
Other (S.I.C. 19, 35, 39)	25.5%	14.0%	46.1%

PRODUCTION capacity for metalworking will be increased 3.5 per cent in 1961. That forecast compares with increases of 4.5 per cent this year and 2.6 per cent in 1959.

STEEL has asked 7450 general managers of metalworking plants throughout the country whether they plan to boost production capacity next year—36.4 per cent of the respondents say they will.

• **More Money for Plants**—More of the expansion dollar will go toward new plants this year than in 1961, report the metalworkers who are planning capacity hikes.

Spending for new equipment will decline. While 57.5 per cent of those planning expansions will buy new equipment next year, the rate

Coming Next Week—STEEL's annual survey of what metalworkers expect 1961 to bring in sales, costs, employment, prices, and profits.

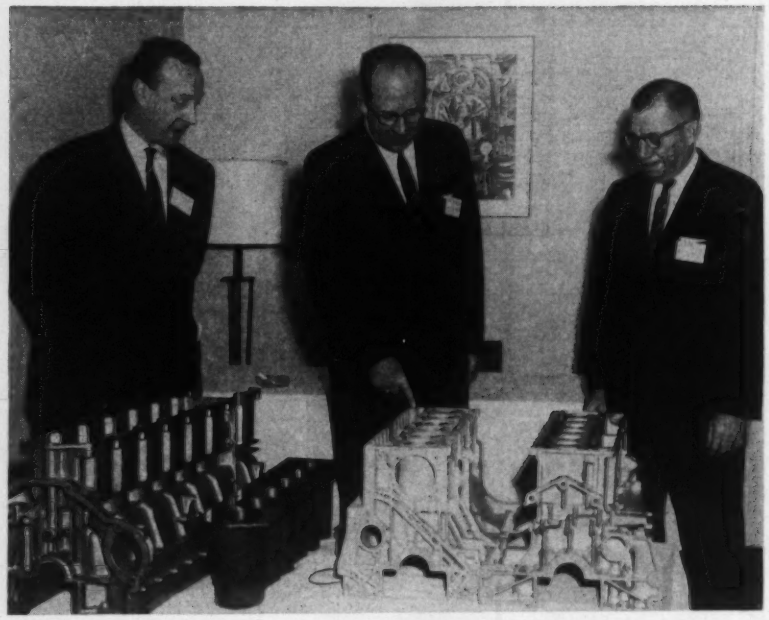
has been closer to 71 per cent over the last three years. In 1956 and 1957, about 85 per cent of those planning capacity increases said they would buy equipment.

Plant additions are being scheduled by more than 1 out of 4 metalworkers who plan to expand next year.

Here is the breakdown by industry group showing the planned percentage increase in capacity:

Primary metals	4.9%
Fabricated metal products	4.0
Nonelectrical machinery	3.3
Electrical machinery	5.4
Transportation equipment	4.1
Instruments, related items	3.3
Other metalworking	2.5

Small plants will expand more than will big ones. Capital shortages will hold up expansions next year, say 15.6 per cent of the respondents.



A. Triulzi (left) of Milano, Italy; A. F. Bauer (center), chief engineer, and F. J. Koegler president, of Doehler-Jarvis Div., National Lead Co., compare diecast engine block as . . .

Aluminum Production Falls 5% Behind '59 Pace

Primary aluminum producers continue to pare their output in the wake of the continued refusal of business to rise to forecast levels. Aluminum Co. of America's chairman, Frank L. Magee, estimates 1960 shipments will fall about 5 per cent behind last year's record. Early forecasts for '60 called for a 10 to 20 per cent rise in sales, and production was geared to that level. Since midyear, producers have been making adjustments in their output to more closely match the downgraded forecasts. Latest cutback: 27,500 tons at Kaiser Aluminum & Chemical Co.'s Chalmette, La., reduction plant. Kaiser is operating at about 66 per cent of capacity.

Though suffering a temporary setback in growth predictions, the industry is anything but pessimistic. Spokesmen point to a host of new, potentially large tonnage applications that will spur sales in the next few years. For example, Reynolds Metals Co.'s vice president, John H. Krey, says aluminum oil cans will take 20,000 tons of the light metal this year. They were introduced only three years ago. The building products market continues strong (see table, Page 158).

Aluminum Engines Take Spotlight at Detroit Show

MORE THAN 100 lb of aluminum will be used in the average U. S. car within the next few years (vs. about 56 lb now), predicted A. F. Bauer, chief engineer, Doehler-Jarvis Div., National Lead Co., at the First National Die Casting Exposition & Congress at Detroit. One of the chief reasons for the gain: Diecast aluminum engines.

Doehler-Jarvis is casting fifty thousand, 68 lb blocks for American Motor Corp.'s six cylinder aluminum engine. Mr. Bauer, a long time advocate of the diecast aluminum engine (STEEL, Apr. 22, 1957, p. 5), said aluminum blocks cost less than gray iron types on a final piece price basis because they can be processed faster. AMC's $5 million machining line can handle 120 aluminum blocks an hour vs. 70 gray iron.

• **Trends**—U. S. automakers are making only dry sleeve aluminum engines. European builders favor wet sleeve designs because their customers hold on to cars longer than Americans do. After a few years of service, the sleeves can be pulled and replaced.

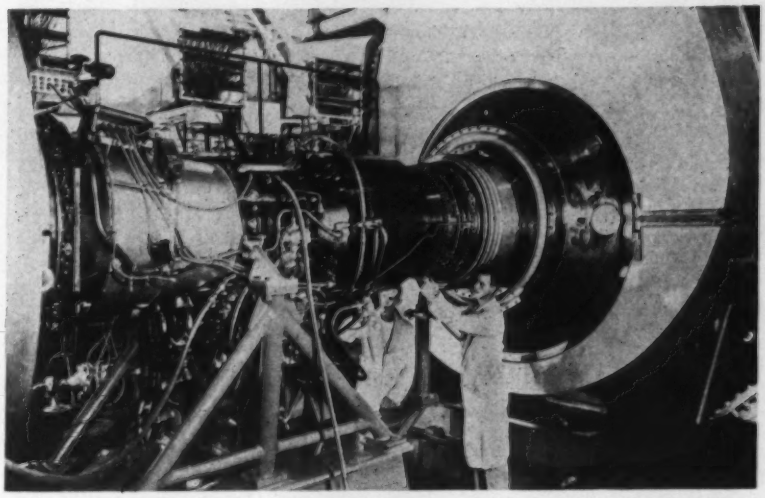
Russia will be the first European country to diecast a water cooled, aluminum engine block. Wet sleeves will be inserted after the block is cast. The 2.5 liter (about 153 cu in.), four cylinder engine will be cast in a 2500 ton Italian machine.

• **Automation**—Several of the exposition's 83 exhibitors displayed automatic diecasting machines. Few are in production, but diecasters think they have great potential.

Size is no longer a deterrent in automatic diecasting, reported engineers from Ford Motor Co. Current problems include: Castings requiring special inserts are hard to produce, as are parts that call for a superior finish or careful handling. Cavities and cores with sharp draft angles still can't be produced this way.

Jet Power Comes Down to Earth

A jet gas turbine is pumping natural gas at a compressor station of the Columbia Gulf Transmission Co.



The forerunner of a new family of stationary power units employing aircraft jet engines is prepared for a test run at Pratt & Whitney Aircraft Div., East Hartford, Conn. A commercial application of this setup began operating last week

THE HARNESSING of jet thrust as a source of stationary power began last week at a place called Possum Trot in the hills of central Kentucky.

A gas turbine, adapted to run on natural gas and using a jet engine as its heat source, is now pumping about 600 million cu ft of natural gas a day in a pipeline compressor station of Columbia Gulf Transmission Co., a subsidiary of Columbia Gas System Inc., New York. By next spring, the installation will be completely automated and operate unattended.

The RT-248 gas turbine was designed by Cooper-Bessemer Corp., Mt. Vernon, Ohio. The J-57 jet is a product of Pratt & Whitney Aircraft Div., United Aircraft Corp., East Hartford, Conn.

• **Demand to Grow**—The co-operating firms expect to find widespread markets in the natural gas, petroleum, and petrochemical industries; in electrical power generation; and in marine applications. Spokesmen also feel the units may have application in any heavy industry. Example: They could be adapted to the blast furnace. Cooper-Bessemer concludes: Although the jet gas turbine is not destined to supersede the reciprocating engine, its value as a future power source is developing rapidly.

• **Low Cost**—The RT-248, which develops 10,500 rotative hp, weighs 17 tons (3.2 lb per installed horsepower), while conventional, reciprocating engines of the same horsepower weigh 256 tons (65 lb per installed horsepower). Conventional turbines weigh about 16.5 lb per installed horsepower.

The total cost of the station is estimated at $1,988,700, or $190 per installed horsepower. The cost of a comparable reciprocating engine pumping station is estimated at $3,832,500, or $365 per installed horsepower. The installation cost of a traditional gas turbine plant approaches that of a reciprocating engine station.

• **Efficient**—The light, jet engine section, weighing 4000 lb and featuring a 10 to 1 compression ratio, requires no regenerative system. Nevertheless, thermal efficiency reportedly equals or excels that of other gas turbines. Maintenance is simplified since the jet engine section can be removed and replaced, ready for operation, in less than 4 hours.

The turbine is said to require less than half the space, a relatively simpler foundation, and lighter crane facilities than regenerative turbines of equal power.

• **Long Life** — The adapted J-57 never reaches "take-off" speeds, temperatures, or stresses. In industrial applications, it will operate at or below low stress flight cruising speed. Results: Low running temperatures and prolonged service life.

Designers estimate the jet section will run at least 8000 hours between overhauls—equivalent to a year of continuous opertion.

Although the fuel cost of the gas turbine is greater than that for a supercharged, reciprocating engine, the difference is expected to be made up by savings in maintenance and other operating expenses.

• **Other Plus Factors**—Additional advantages of a gas turbine installation are cited:

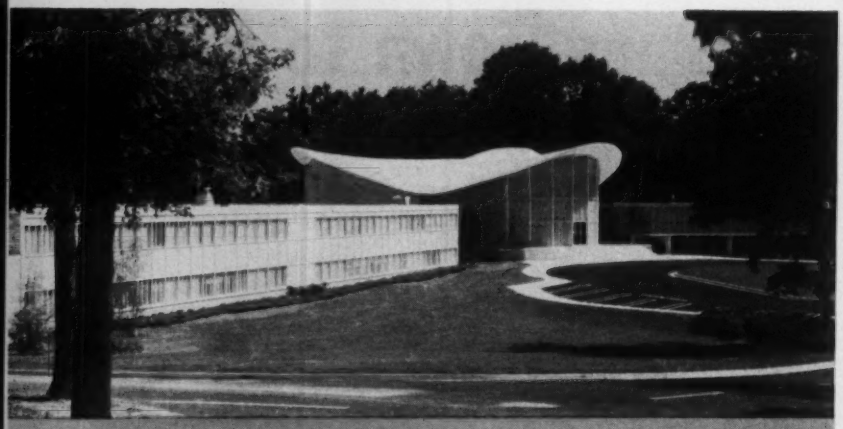
Practically no cooling water requirements and low lubricating oil needs.

Elimination of vibration in the turbine station.

Uniform torque which eliminates the problems presented by cyclic variations in a reciprocating engine.

Greater suitability for driving a centrifugal compressor because the output shaft can be directly connected to the compressor.

• **How It Works**—Raw thrust of the jet section is converted to rotative power by a special, heavy duty, free turbine, completing the unit that comprises the RT-248. The J-57 drives a centrifugal compressor which pushes natural gas through the pipeline.



Know the managers you hire and what they need. Then provide them with the facilities, atmosphere, and people to do their best work. That's the philosophy of Dr. Arch C. Scurlock, president, Atlantic Research Corp.

He Thrives on Government Business

"WITH SO MANY companies complaining about doing business with the government, it's refreshing to talk to an executive who enjoys and thrives on government business."

That's the way a career employee in the Defense Department describes Dr. Arch C. Scurlock, 40-year-old president of Atlantic Research Corp., Alexandria, Va. Company statistics support his observation.

Atlantic Research sales have climbed nearly as fast as the solid fuel rockets it has developed—from $44,657 in 1949 to an estimated $13 million this year. Nearly 80 per cent of its work is for the federal government in such fields as solid rocketry, advanced electronics, missile materials, and instruments.

"We're not afraid of government work. It's good work. Firms like Atlantic Research are needed," emphasizes Dr. Scurlock. He has booked $8 million worth of new business for his 1400 employee, science based firm in the last six months.

A graduate of Massachusetts Institute of Technology, Dr. Scurlock has contributed much to his firm's technical advancement, but he now spends his time "talking, encouraging, or arguing" with his department chiefs, preferring to be a catalyst, rather than a direct participator.

• **Two Plus Two Equals Six**—Friends and competitors alike credit the scientist-turned-administrator with a flair for buying smaller firms and molding them to the Atlantic Research pattern of doing business.

"You should know everything about a company before you buy it," he points out, "but that would take so long, you'd never get it done. A science based company like the ones we have acquired is probably worth its annual volume of business—if it has a net worth of one-seventh to one-fifth of that volume. Its real value is in its people—you adjust your evaluation of the firm with your judgment of the quality of its people. Somewhere in the firm you have to see how two plus two adds up to six. Then the deal is worth making.

"Management in our type of firm is like a university faculty," he points out. "Our department chiefs are like M.I.T. department heads. They are given freedom, and, in turn, a lot is expected of them." He stresses this point: Management must first know the top men it hires and what they need. Then it must provide them with the facilities, atmosphere, and personnel they need to do their best work. To supply incentive, about 150 staff members are on a stock option plan.

Much of Atlantic Research's growth stems from problem solving.

Example: It once felt that available laboratory mixers for solid propellents were not satisfactory. So it developed its own and has since gone into the production and sale of mixers. Another product it sells: An apparatus that measures the burning rates of solid fuels.

The firm's purchase of a Burroughs Corp. 220 computer led to the rental of computer time. When the Army suggested the redesign of a telemetry system for an Atlantic Research rocket, the firm did the job itself.

• **The Look Ahead**—Dr. Scurlock doesn't buy the vogue of five and ten year planning for his type firm. "Our job is service," he says. "Using current information in a number of fields, we are like the scientist conducting laboratory research. When asked where he is going, he will tell you to come back in six months after he understands a little more about his problem. It appears to be most profitable for us to think only 6 or 12 months ahead."

Product development may be emphasized more at Atlantic Research than it has in the past, but the young president says he'll stick primarily to his basic science approach. He points out that he and his firm are in a field where competition is between people, not prices. That's the way he wants to keep it.

Back of his philosophy is this belief: "The government will be spending more money on scientific competition with the Russians than on weapons alone."

Waterways Lure Industry

The attraction of waterside sites as industrial plant locations continues strong, reports the American Waterways Operators Inc. In the third quarter, 59 installations were constructed or planned, bringing the year's total (new or expanded facilities) to 181.

Metalworkers who built or announced projects in the third quarter included: Air Products Inc., Union Carbide Corp., Armco Steel Corp., Reynolds Metals Co., Ford Motor Co., Whittaker Marine & Mfg. Co., Kaiser Aluminum & Chemical Corp., Bethlehem Steel Co.

College Economist Sees 2% Rise in GNP in '61

GROSS NATIONAL product will rise to a $515 billion annual rate next year, up 2 per cent from 1960's estimated $504 billion. Plant and equipment spending will drop $1 billion to $2 billion next year.

Those predictions were made last week by Prof. Daniel B. Suits, University of Michigan, at the university's Eighth Annual Conference on the Economic Outlook.

Professor Suits bases his forecast on a mathematical model of the economy which has correctly indicated changes in the business climate since 1953.

The economist also sees total car sales (including imports) declining 300,000 units—from 6.5 million this year to 6.2 million in 1961. Lower interest rates will boost nonfarm housing starts from 1.2 million to 1.4 million.

• **Employment**—But despite more business activity, Professor Suits believes unemployment will increase even though employment will climb from 66.9 million to 67.1 million. He figures jobless workers will rise by 500,000 to a 4.3 million level, which will be 6 per cent of next year's labor force (71.4 million).

The economic model made no special allowances for political changes. Professor Suits says the forecast is based on the assumption that there will be no change in consumer credit terms and that government spending will increase $4.5 billion. He assumes a $2 billion hike in defense orders during 1961 and continued easing of money.

• **Consumer Attitudes** — The university's survey of consumer spending tends to support Professor Suits' forecasts. The latest findings, reports Prof. George Katona who heads the survey, indicates that consumer optimism (based on intentions to buy) has moved sidewise in the last few months.

Pointing out the differences between the present economic climate and consumer attitudes in late 1957, Professor Katona states that there is less resentment now against price increases and higher interest rates. "Today, the major reason people are concerned about the business outlook is the absence of good news —things which the public feels could sustain or stimulate prosperity," he adds.

Commenting on the "saturation mongers" who feel our capacity to produce exceeds our economic needs, Professor Katona charges: "Saturation is an attitude, not a function of the number and kinds of goods we have. The only meaningful concept is that of felt needs or wants. Things people would like to have have increased substantially in the last ten years. So many wants are insistent now that people must economize."

PLASTIC COATED STEEL PIPE will carry natural gas through 22 miles of highly corrosive coal field soil and swampland to serve Corbin and London, Ky. Where particularly rocky soil was encountered during installation, the pipe, made by Republic Steel Corp., was eased into position by side boom tractors following close on the cleats of a trencher

Steelmaking Advances Spur Sales of

How Oxygen's Used in 60 Steel Mills

OXYGEN USAGE	Percentage
Blast furnace	1
Open hearth roof jets	25
Open hearth decarburization	13
Open hearth combustion oxygen	15
Miscellaneous metallurgical	8
Hand scarfing	14
Machine scarfing	13
Scrap separation	5
Construction and maintenance	6
Total	100

Source: Linde Co., a division of Union Carbide Corp.

MAJOR oxygen producers are turning to on-site plants to satisfy mushrooming demand. Total annual production of high purity oxygen has leaped from 22.1 billion cu ft in 1954 to 44.9 billion cu ft in 1959.

Two reasons are cited for the gain:

1. Increased consumption by the steel industry.
2. The trend toward on-site oxygen generating facilities which began in earnest five years ago.

• **Sales Continue Up**—Most major suppliers to the steel industry expect sales in 1960 to top those in 1959, although one supplier whose first half sales were 9 per cent ahead of last year's now reports business lagging 12 per cent below prior forecast.

A reduction in steel production does not materially affect sales. The practice among companies employing oxygen is to bank the least efficient furnaces and to operate those equipped with oxygen. In July, when the national steel operating rate reached 50 per cent of rated capacity, oxygen converters continued to operate above 80 per cent.

One gage in measuring sales activity is to determine the number of on-site plants put on stream in 1960. For example, Linde Co., a division of Union Carbide Corp., New York, installed three plants

On-Site Oxygen Plants

with a total daily capacity of 760 tons. Hydrocarbon Research Inc., New York, built a 400 ton a day plant for the Steubenville Works, Wheeling Steel Corp., Steubenville, Ohio.

Under construction are 16 plants that will supply some 4900 tons of oxygen a day to steel plants.

• **Thanks to Steel**—The biggest impetus to the growth of oxygen sales has been its adoption by the steel industry for metallurgical purposes. Today, the industry consumes about 45 per cent of total on-site oxygen output. Second largest consumer is the chemical industry which takes 41 per cent.

A composite of 60 steel companies shows this breakdown by use: Metallurgical, 62 per cent; scarfing, 27 per cent; scrap separation, 5 per cent; construction and maintenance, 6 per cent.

• **On-site Concept Turns Tide**—The construction of on-site plants has gained momentum during the last five years. Though by no means new, the concept has been modified: The supplier now builds, operates, and retains ownership of the plant; the gas is sold under long term contract.

A number of factors make that arrangement desirable:

1. The gas is cheaper.
2. Funds formerly required for oxygen equipment can be applied to steel facilities.
3. It guarantees the user an uninterrupted supply.

The price of the gas has been reduced. Linde says the price of the gas for a 270 ton plant has decreased from about $14 to $12 a ton in ten years. When Air Products Inc., Allentown, Pa., built the 500 ton a day installation for Weirton Steel Co., Weirton, W. Va., it was able to produce oxygen for 3 cents per 100 cubic feet compared with 30 to 35 cents per 100 cubic feet for hauling bulk liquid oxygen. Today, on-site plants can deliver the gas for around 5 cents per 100 cubic feet. (Costs have gone up.)

• **Demand to Continue**—Air Products' present daily capacity for the steel and metalworking industries is about 1700 tons. Planned increases: To 3800 tons a day by 1961; 6300 tons a day by 1965; 10,000 tons a day by 1970.

Linde reports its daily national capacity to date is 3623 tons. It expects to reach daily production of 6228 tons by 1962.

Air Reduction Co. Inc., New York, figures its daily capacity is 1500 tons (more than one-third is devoted to steel). It is building a 120 ton a day plant for the Tennessee Coal & Iron Div., U. S. Steel Corp., Fairfield, Ala., and is negotiating to build a 675 ton a day plant for Bethlehem Steel Co., at Johnstown, Pa. Planned to be started in the next year are six to eight additional plants with capacities between 200 to 400 tons a day.

National Cylinder Gas Div., Chemetron Corp., Chicago, with 11 on-site plants expects to expand its activity in this field.

• **Another Marketing Twist**—Linde proposes to build a central plant in the ship channel area of Houston to supply high purity oxygen and nitrogen via pipeline to a variety of industries. Initial plans call for a line 8 miles in length. Linde has already contracted to supply 140 tons a day to the Sheffield Steel Div., Armco Steel Corp., and 320 tons a day to Diamond Alkali Co.

Argentina Steel Mill Gets $12 Million Credit O.K.

The Export-Import Bank of Washington has granted a $12 million credit to an Argentine steelmaker to buy U. S. equipment.

The credit will help Sociedad Mixta Siderurgia Argentina complete construction of its $322 million plant at San Nicolas, bank officials said.

Armco International Corp., subsidiary of Armco Steel Corp., is technical director and general consultant on the project.

J&L Plans Tin Plate Capacity Hike, Aims At Soft Drink Market

THE TIN vs. aluminum can marketing battle rages on. Another major target: The carbonated beverage business.

Last week, Jones & Laughlin Steel Corp. announced plans to boost its annual tin plate capacity to nearly 600,000 tons with a third tin plate line at its Aliquippa, Pa., plant. Production starts early next year. National tin plate capacity exceeds 8 million tons annually.

"Last year, the steel industry shipped over 49,000 net tons of tin plate to soft drink manufacturers," reports Walter F. Donaldson Jr., manager of J&L's tin mill products. In the first eight months of 1960, the industry took more than 54,000 tons for its soft drinks.

In a survey of soft drink users by J&L, bottles won most of the votes, but when cans were compared with no-deposit or returnable bottles, cans held their own. Users expressed a definite preference for cans in three areas: Safety, handling, and convenience.

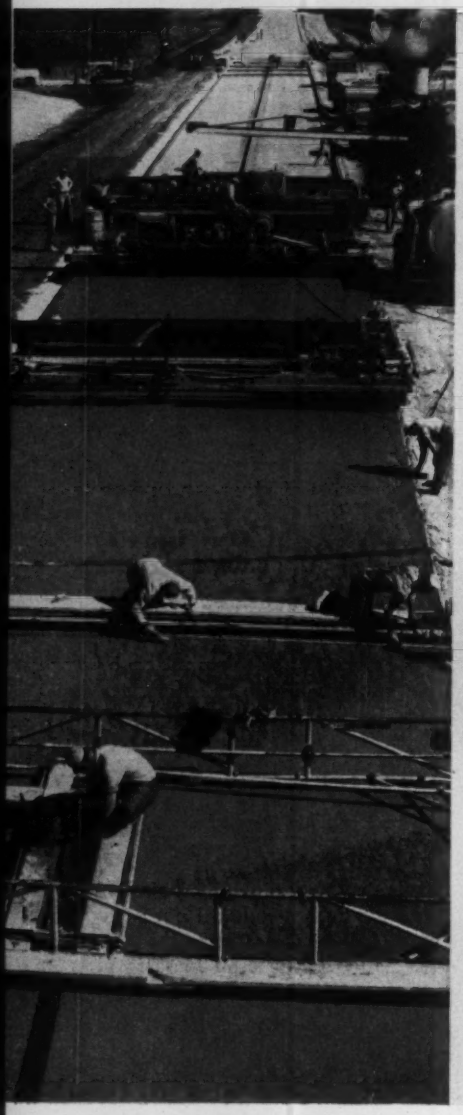
J&L sources claim that steel has an edge over aluminum costwise because the light metal will not withstand the pressures generated by carbonation without an increase in thickness and in costs.

Bottling industry executives report that it costs between 3.5 and 4 cents to make a soft drink, compared with 4.5 to 5.5 cents for a no-deposit bottle and 7.5 cents for a returnable bottle.

A survey by the Soft Drink Bottlers Association indicates that 29 per cent of the nation's bottlers handled cans in 1959. This year, the number has increased to 43 per cent.

Have you entered the Usership Contest?

See the Servicenter, Pages 5 and 6.



Congress Faces Five Highway Problems

- Should highway user taxes be spent for nonhighway purposes?
- Can the 41,000 mile interstate system be completed by 1972?
- Should highways be managed more closely by Washington?
- Should toll roads be incorporated within interstate system?
- Can Congress avoid a slowdown in the program in 1963 by passing stopgap legislation?

THE 41,000 mile interstate system will be thoroughly re-evaluated in Congress during the next two years.

Solutions to the questions raised (see checklist) must be found or metalworking stands to lose much.

So far, reports the Bureau of Public Roads, 9579 miles of the system have been opened to traffic. Another 4575 miles are under construction. Engineering and right-of-way acquisition are going ahead on 9993 miles. In the program's four year history, $3.2 billion has been spent for construction, $938 million for engineering and right-of-way acquisition. Almost $3.3 billion worth of construction is underway, while $1.9 billion is authorized for engineering and right-of-way acquisition. Ninety per cent of the program is financed by the federal government.

About 200 tons of structural steel, 200 tons of reinforcing steel, 35 tons of culvert pipe, and 50 tons of miscellaneous steel products are required for each $1 million worth of construction.

The program has many indirect benefits: Industry tends to follow new highways.

This program has come under heavy fire from President-Elect Kennedy. He charged, during the campaign, that it lacked "high level planning and co-ordination" and noted serious charges of "waste and corruption." He recommended giving the program "cabinet level direction."

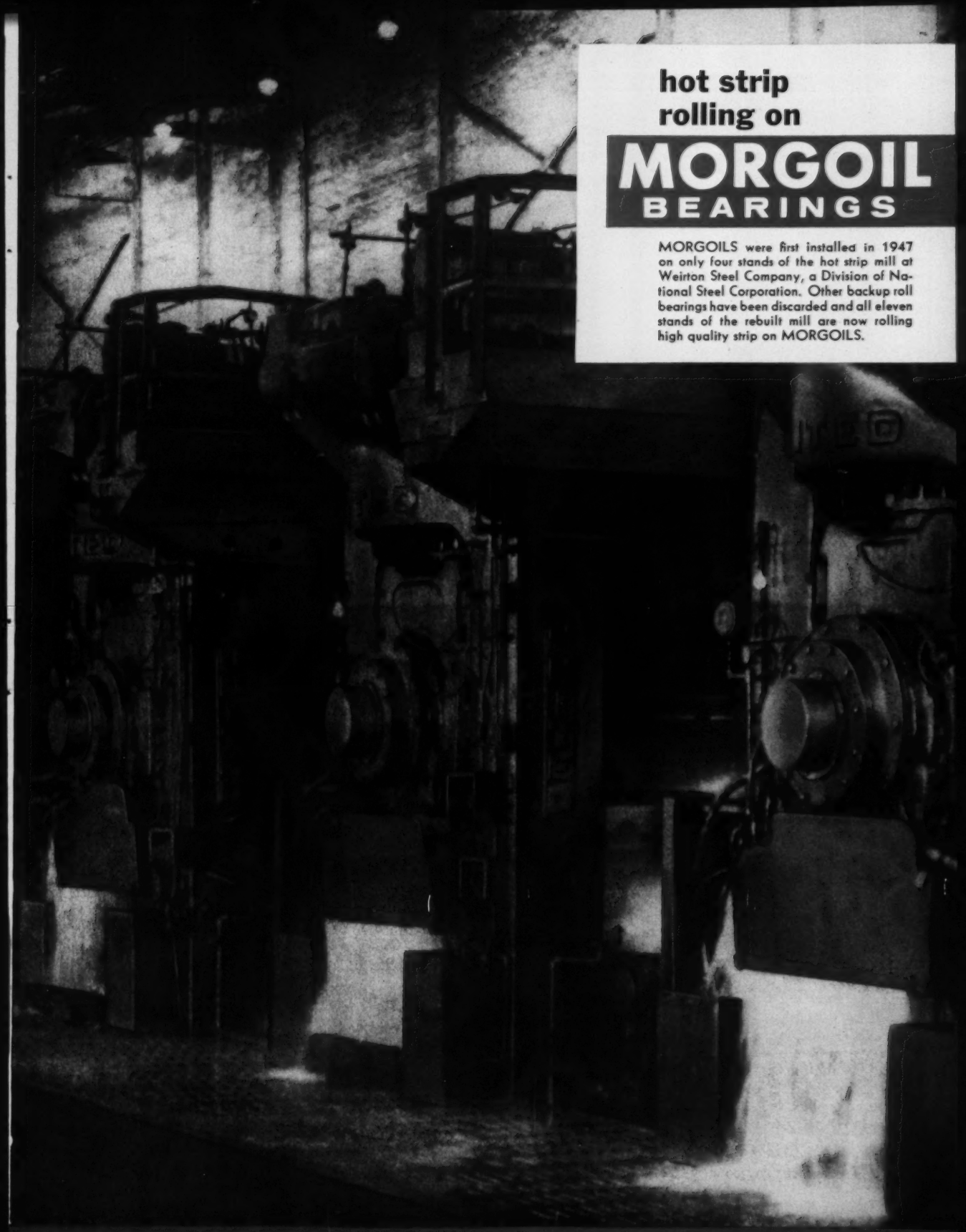
Washington observers will not be surprised to see the new President suggest a new cabinet post: Secretary of Transportation and Urban Problems.

● **ROAD REPORT DUE**—Congress anxiously awaits a report from the Bureau of Public Roads (due in February) which will evaluate the interstate system in terms of user and nonuser benefits. It may trigger a new financing method. Under the Democrats, the famous pay-as-you-go formula of the highway trust fund could be substantially changed, although the conservatives will fight hard for the status quo. It is certain that President-Elect Kennedy can be counted on to use highways as a method of giving the economy a shot in the arm during a recession. If the economy isn't looking better by January, you can expect him to recommend a speedup in the program.

● **FAST ACTION NEEDED** — One observer who wrote several position papers for Mr. Kennedy during the campaign reports the first problem is to find a new administrator for the program. Then the President-Elect will expect him to come up with a complete package to present to Congress after the report from the Bureau of Public Roads is in. Action seems to be demanded because Congress must at least authorize funds for fiscal 1963 to avoid a slowdown while the states await a guarantee that federal money is on its way.

There's also a possibility that the highway program will be stretched out to 1975, instead of the present 1972 schedule.

● **BIGGEST PROBLEM OF ALL:** The different views about the highway program which are expressed through some of the most powerful lobbying groups on Capitol Hill. The Kennedy writer told STEEL: "If we present a strong enough program linked with a strong administrator, maybe we can get it through Congress while the lobbyists are busy cutting each other up."



hot strip rolling on

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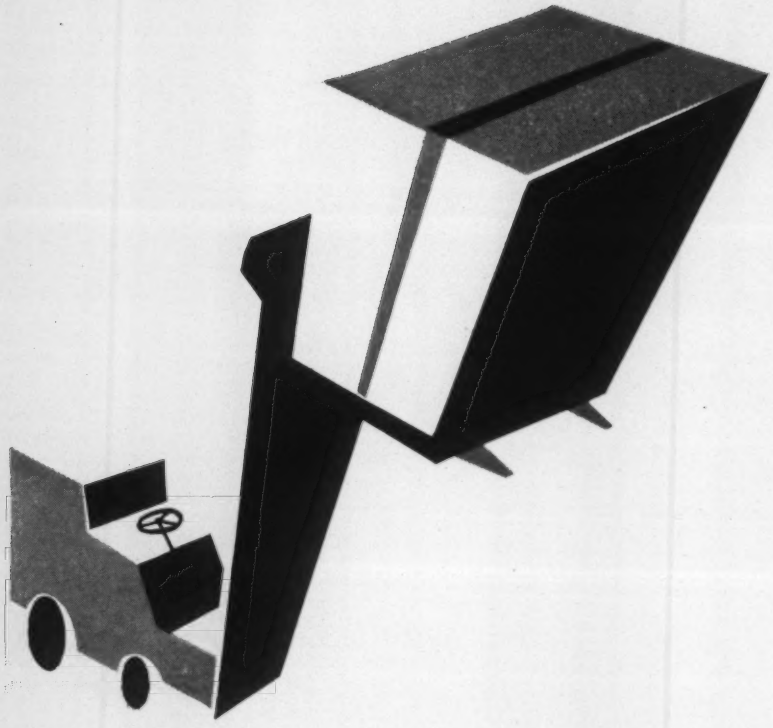

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NEW CONCEPTS IN PRACTICAL OFFICE AUTOMATION

MATERIALS EFFICIENCY

Put a Pro in PURCHASING

THE CHRYSLER incident focused the public spotlight on unethical business practices. It intensified public indignation aroused by the radio-TV payola scandals. And it whetted the investigative instincts of government officials.

While most metalworking executives are more concerned about the petty breaches of business morals, the Chrysler case does illustrate one of the biggest blocks to professionalism in purchasing—failure of top management to set a high moral tone.

There are many other barriers to professionalism in the purchasing department: Lack of education, lack of knowledge, failure to use professional tools (like value analysis and vender rating), lack of objectiveness in dealing with suppliers, overemphasis of price, acceptance of payola, lack of a "good deskside manner," failure of the purchasing agent to dissociate himself from routine details where possible.

But those shortcomings don't hide the fact that purchasing has come a long way in a short time. The procurement problems of World War II gave the PA new stature in the business community. He has continued to upgrade himself until he is now on the verge of professionalism, or in some cases, has reached that rank.

Many dedicated purchasing people deserve this new status. Their occupation requires considerable knowledge and preparation.

But some purchasing men continue to be their own worst enemies in their drive toward professionalism. Some, for example, have indicated to STEEL that they think they deserve special recognition just because they spend 50 per cent of their companies' sales dollars. Listen to Duncan P. Forbes Jr., purchasing agent for Gunite Foundries Corp., Rockford, Ill., refute that claim: "The village idiot could buy a lot of standard items equally as well as the sharpest purchasing agent." He points out that the true test of professionalism is not the volume of his effort, but the quality of his performance.

● **What Is a Pro?**—From talks with authorities, STEEL has arrived at this definition of a purchasing professional: He is an intelligent, honest, loyal man who accepts and practices the policies and objectives of his company. He has a thirst for knowledge—and puts his experience to work for the company. He recognizes the problems of other departments and constantly seeks to assist them. He thoroughly understands the manufacturing operations and engineering practices of his company. He is receptive to competent counsel—internal and external. He buys without prejudice, denounces all forms of commercial bribery. He uses the tools of a professional, such as value analysis and vender rating. He earnestly seeks out all sources of information and material to improve his company's performance. He is skilled in human relations techniques. And he is constantly aware that he represents his company—that the image he creates in the eye of a potential supplier is the image the supplier will hold of his company. He is a student of new technology.

E. F. Andrews, director of purchases, Allegheny - Ludlum Steel Corp., gives these specifications for a purchasing pro: ". . . an improved negotiator, bringing together essential economic data, improved specifications, and real *savoir faire*. The process of negotiating goes beyond the perfunctory calling for bids. Negotiating calls for personal skill in interviewing and per-

GALEN ANDREWS
Manager of Purchases
Barnes Drill Co.

". . . conduct myself as a credit to all I represent."

"ETHICS is a matter of personal attitude. No matter where I am, first of all, I represent myself. I want respect for my family. I also represent a company and a community. It is my privilege—and my obligation—to conduct myself as a credit to all I represent.

"But integrity is only one aspect of professionalism. The professional purchasing man must be completely familiar with his company; he must know manufacturing operations and engineering practices as well as suppliers' products. He must know how to work with all people.
work with all people.

"The new buyer must be a good listener. He must understand that, in most of his daily business conversations, the other person knows more about the subject than he does: The salesman knows more about his product; the engineer has a better understanding of his problem; the accountant has a more precise idea of costs; the foreman has a more intimate understanding of his manufacturing operations.

"To improve professionalism, the buyer must know the principles and problems of purchasing as they pertain to engineering, sales, production, accounting, traffic, law, economics, marketing."

suading. The buyer will have to be alerted to gathering information on the suppliers' plants, costs, substitutes, and alternatives. He must be extremely flexible and versatile. He will have to become an expert in motivating his venders to solve his company's problems."

Or as A. G. Ruediger, director of purchases, Carrier Corp., puts it: "The professional purchasing agent . . . must be a good negotiator, arbitrator, salesman, aggressively analytical, inexorable, indulgent, impatient, and imaginative."

So purchasing professionalism has many requirements. Three—need for more knowledge, greater use of professional tools, higher ethical standards—are of prime importance. STEEL has devoted the previous nine articles in this series to a discussion of the knowledge needed and the tools available. Let's take another brief look at those areas, then examine the third element—ethics.

Knowledge

"Professionalism starts with your selection procedures," says Galen Andrews, manager of purchases, Barnes Drill Co., Rockford, Ill. But it doesn't stop there. The new buyer must be counseled and taught how to increase his knowledge.

Mr. Forbes lists four areas in which the buyer should have knowledge:

1. Financial. He must understand the cost of borrowed money and the reasons behind decisions on alternate uses of money. He should understand a balance sheet. He should know how costs are determined and how burden is spread. He should also understand how his decisions will affect the company's breakeven point.

2. Manufacturing. Factory supervision is good training for purchasing people. Buyers should "get the feel of what the operating departments are up against."

3. Methods. For example, the buyer should be aware of what electronic data processing can do for him.

4. Over-all. Purchasing men need an over-all viewpoint on the company's objectives. Participation in methods improvement and cost reduction programs will help get it.

Glenn L. R. Baumhardt of Redmond Co. Inc., subsidiary of Controls Co. of America, Owosso, Mich., points out that the National Association of Purchasing Agents encourages work with universities and with other associations, which, says Mr. Baumhardt, "is a stimulus to improving purchasing techniques, to say nothing of the opportunities to exchange ideas and problems with other people in the profession."

Another point: The buyer should be fully aware of any pending labor problems in any supplier's plant, so he can protect himself.

Adds W. E. Gombert, purchasing agent, Addressograph-Multigraph Corp., Cleveland: "In this complicated era of doing business, simplification of procedures and the elimination of waste are musts."

Tools of the Trade

Value analysis is one of the tools in the professional PA's kit. Also included should be vender rating systems, forecasting procedures, supplier research techniques, performance standards, simple but effective communication procedures, and time budgets. Those tools are discussed in more detail elsewhere in this Materials Efficiency series.

"If the moral fiber of management is weak . . ."

C. F. OGDEN
Vice President
Detroit Edison Co.

"UNETHICAL purchasing practices, like diseases, thrive best where the tissue is weak. If the moral fiber of management is not strong enough to set a pattern for subordinates, then unethical practices creep in at lower levels. It is surprising how even some seemingly inconsequential actions by management get distorted into a license to perform unethical practices by men at lower levels.

"I consider it extremely important that a lot of attention be devoted to the selection of buyers. But that is not enough. They must be trained to do their job well and imbued with a spirit of cheerfulness, co-operativeness, and honesty. On top of this, they must be paid well enough that any attempt at bribery or other unethical practice falls on deaf ears.

"I believe that the buyer has to read a lot and be well informed not only about the products he buys but on national and world economic problems, legislation, new materials, new products, and advanced technology.

"The buyer should have as much time as possible to reason and analyze. So repetitive, routine operations must be eliminated or minimized."

Ethics

The Chrysler affair and the radio-TV payola scandals have aroused the investigative instincts of congressmen and other government officials. One U. S. senator has promised to "scrutinize the whole problem of conflict of interest in corporations." Public hearings may come about early next year. A House subcommittee will study the Chrysler matter and similar situations elsewhere "to see if additional laws are needed in this area." And the Securities & Exchange Commission is already trying to decide whether it has enough powers to halt what it terms current injurious practices. Some SEC officials say there are loopholes that should be closed.

The law requires the purchasing agent to give strict and undivided loyalty to his employer. Numerous court decisions bear out the legal responsibility of the purchasing agent to account to his employer for any secret gain or profit realized in the course of his work. And the language of the decisions makes it clear that the principle applies to even minor gifts. Cease and desist orders by the Federal Trade Commission have taken the position that it is improper for the seller secretly to give to any employee of the buyer ". . . any money, or gratuities, such as liquor, cigars, meals, valuable presents, or theater

"Purchasing men must raise their own standards . . ."

A. J. MELKA
Purchasing Agent
Hydraulic Dredging Co. Ltd.

"TO ACHIEVE professional status, purchasing agents must raise their own standards. These are some basic steps and goals: 1. Control entrance into the field by setting requirements. 2. Support and enforce the standards of practice. 3. Weed out the unqualified and incompetent by using a classification system. 4. Raise standards of training for teachers. Remove those who are unsatisfactory. Establish higher grades for passing. 5. Prepare examinations. 6. Establish a board of examiners.

"Skill as a bargainer was important in the old days of purchasing, but modern business practice has curbed the 'chiseling' type of purchasing agent. Purchasing . . . is getting more opportunity to voice an opinion on the formulation of general management policies. From this recognition is emerging a new and improved system of purchasing policies, techniques, research, and a broader understanding of subjects not particularly aligned to purchasing. We are starting to learn and understand the operations of other departments.

"Also, the purchasing educational program has gone to the colleges and universities, with 116 schools offering at least one course in purchasing."

R. D. CRANE
Director of Purchases
Dresser Industries Inc.

"If he'll cheat on his company, he'll cheat on anyone"

"IF AN INDIVIDUAL will cheat on his company, he will cheat on anyone. All companies should run a complete investigation before hiring, establish salaries commensurate with position, spell out responsibilities through position descriptions, furnish procedures that are clearcut, and controls that would discourage unethical practices.

"All companies should adopt a policy pertaining to ownership in suppliers and set up proper controls as an audit of compliance. Top management should gain greater understanding of the purchasing function and be able to evaluate the performance of the purchasing department.

"Here are seven things to do: 1. Include purchasing on the management team. 2. Define purchasing's functional responsibilities and organize accordingly. 3. Develop standard material costs. 4. Establish a material cost reduction program. 5. Contribute to company profit improvement plans. 6. Furnish top management with monthly control reports. 7. Participate in a management development program."

tickets, or make any loans, as an inducement to cause the employer to purchase. . ."

So purchasing people must recognize that the law is broad enough to cover even minor amenities between salesman and buyer. But the professional doesn't need to be forced by law into doing what his common sense tells him is in the best interests of his employer.

• **Brass Must Lead**—Top management must set the proper moral tone if it expects its purchasing people to observe the principles of good conduct.

What should top management do? "First, set an example," answers Galen Andrews. Next, adopt a formal written company purchasing policy, say C. F. Ogden, vice president, Detroit Edison Co. Standard Pressed Steel Co., Jenkintown, Pa., is one company with such a written code. Comments H. T. Hallowell Jr., SPS president: "I believe it good business to have such established purchasing policies, to live by them and live up to them." The payoff of such tone setting by top management: "Our buyers are encouraged to join suppliers for lunch, but they must pick up the tab at least half the time. And our people are discouraged from accepting any gifts," says John P. Moorhouse, SPS director of purchases. A National Industrial Conference Board survey finds that only 1 in 10 firms has written policy statements regarding outside business activity of key employees.

David S. Gibson, vice president, Worthington Corp., Harrison, N. J., says top management can insure higher ethics by: 1. Recognizing purchasing as part of the management team on par with marketing, engineering, and manufacturing. 2. Being more selective in taking people into purchasing. 3. Establishing an educational program that offers at least partial tuition refund. 4. Supporting and participating in purchasing educational work in schools and associations.

"Top management must play by the same rules in regard to its own purchasing agents as it does through its salesmen to customers' PAs. If the purchasing department is buying gifts for its company's salesmen to hand out, then the company can't expect the buyers to refuse gifts offered to them," points out Mr. Andrews. "It is, of course, the individual buyer's prerogative to refuse a gift, even though management has not set a policy," he adds.

George M. Mosher, purchasing agent, Drake University, says top management can raise the professionalism of its purchasing people by encouraging them to attend purchasing conferences and meetings of the National Association of Purchasing Agents.

E. M. Krech, director of purchases, J. M. Huber Corp., Hillside, N. J., offers this suggestion: "Pay purchasing people commensurate with their responsibilities and then insist that they produce accordingly."

Materials Efficiency

Get More for Less

That's the article coming up Dec. 5 in STEEL's 1960 Management series. For a free copy of any or all articles in this 13 part program on materials efficiency (which started July 4 and is running every other week for the rest of the year), write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio. Also available on the same basis is the companion series on production efficiency which appeared during the first half. Use of material like this may win you $1000. For details, see Pages 5 and 6.

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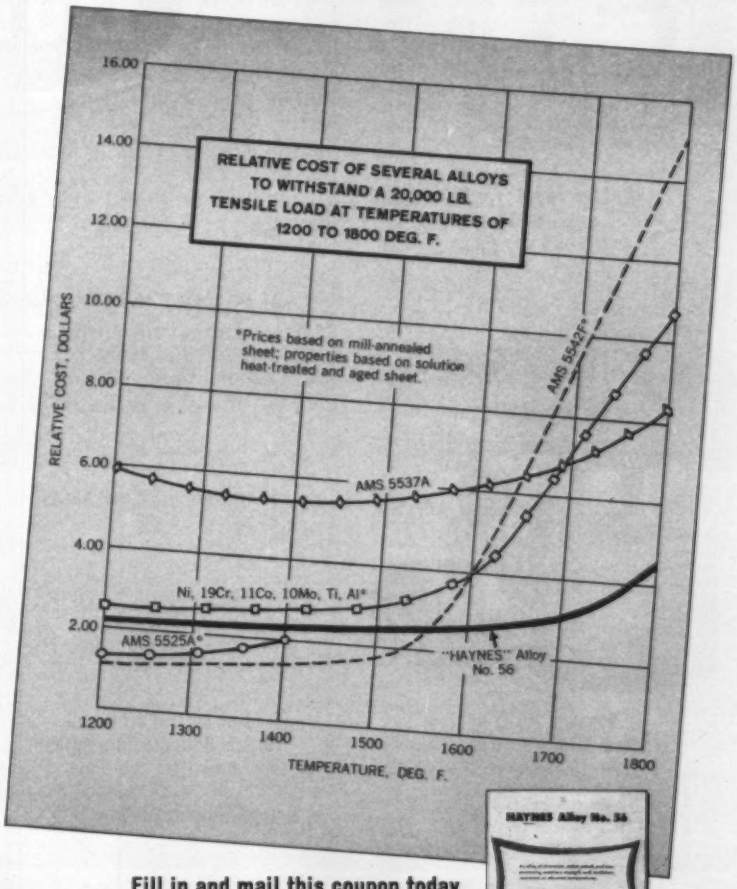

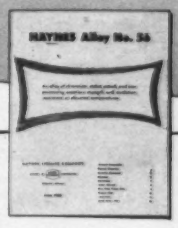

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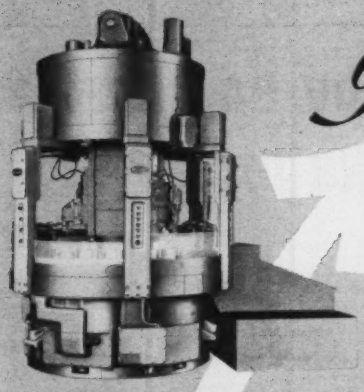

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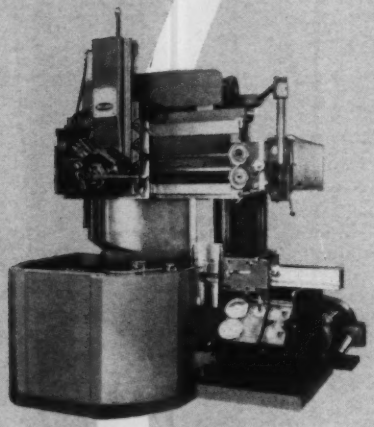

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For fully automatic operation, can be applied to any or all heads of Dynatrol at time of ordering or at a later date.

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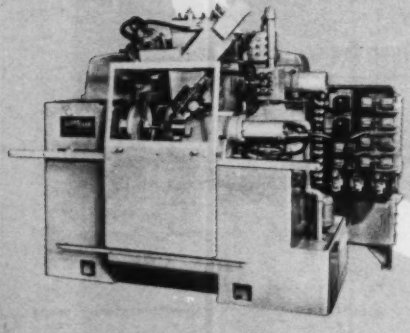
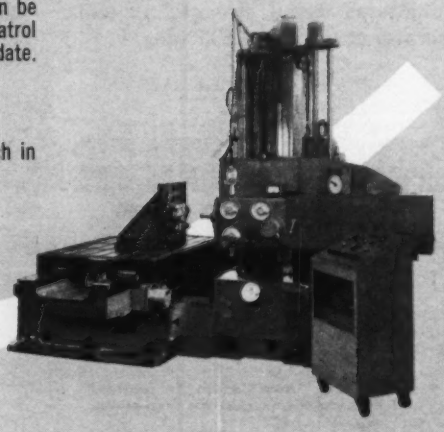
In 3", 4" and 5" spindle size. Many combinations of bed length, table size and vertical travel.



Hydra-Feed Lathe
Automatic and tracer models each in four sizes.



Automakers Set Sights on '62

- **More Compacts Coming.**
- **De Soto's Fate Questionable.**
- **Four-Cylinder Aluminum Engine Pending.**
- **Ford's Small-Small Car Still Coming.**
- **Battle to Trim Weight Continues.**

ALTHOUGH the selling season for 1961 cars is barely underway, automakers are already preparing 1962 model introductions.

Most of the '62 tooling programs will be let by Dec. 15. Some are out now. At least three more compacts will be introduced next fall. Tooling for them is being started slightly earlier than regular '62 work, so there won't be a jamup in facilities when the big, 1963 programs break a year from now.

Ford and Chevrolet are scheduling new models which will be larger than the Corvair and Falcon but smaller than this year's standard sized cars. The Ford will reportedly be 197 in. long and built on a 115 in. wheelbase. It will be in the same 2700 lb weight class as the Buick-Oldsmobile-Pontiac compacts. An extended version of the car on a 118 in. wheelbase appears to be slated for Mercury. Contrary to some reports, the cars will not replace the lowest priced Fairlane and Meteor series in 1962. The now standard sized cars will be reduced to single model lines.

Chevrolet is tooling a compact that's supposed to be built on 114 in. wheelbase, 6 in. longer than the Corvair and 2 in. shorter than the B-O-P compacts. Latest report is that the GM division is proceeding on a slightly delayed schedule to meet fall introductions. Apr. 1 is the initial delivery date for most of the tooling, although some releases indicate final deadlines will be June 1.

• **S-P Special**—Studebaker-Packard will have a new compact too. It may be out earlier than the rest of the pack. The car has been designed by the Raymond Loewy organization, which has been retained by S-P as an advanced styling consultant. Unconfirmed reports have it that the car will be built on a 95 in. wheelbase and will be powered by a cast iron, four cylinder engine with 110 cu in. displacement. S-P may try Pontiac's trick of running the abbreviated block through its regular machining line. Reported cost of the whole package is $26 million.

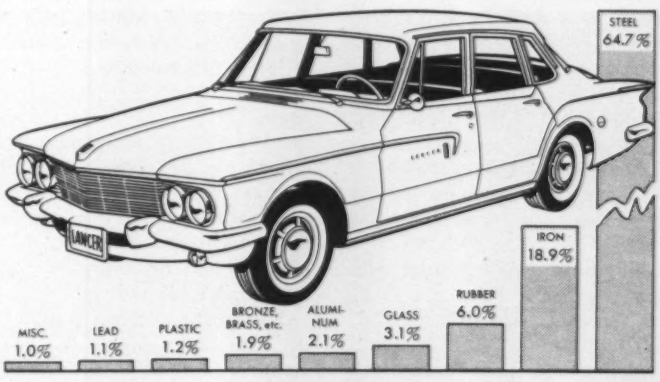
• **Cardinal Coming**—Ford's small-small car, the Cardinal, has been an "off again—on again" proposition. As of now, the 1650 lb car still seems to be moving toward a 1962 debut. Tipsters say Ford has finally settled on front wheel drive and a narrow angle, V-4 engine which reportedly has 90 cu in. displacement. Wheelbase is supposed to be 96 in. It's fairly certain that the Cardinal has few parts in common with the small car Ford is preparing in Germany for the European market.

• **De Soto Dubious**—The fate of Chrysler's De Soto is being questioned. The division will neither confirm nor deny reports that production will be phased out in mid-December. Only one supplier has told STEEL the car will be continued.

Thinking around Detroit is that enough De Sotos will have been built by the end of the year to carry dealers through the model season.

Next question: If the De Soto is phased out of production, will its named be dropped? Reliable sources claim the car will return in 1962 as a luxury styled compact

What Is a Car Made of?



Steel accounts for nearly two-thirds of the weight in today's autos. Above are the percentages of materials used in the Dodge Lancer

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George Romney, president, American Motors Corp.

Broaches World Market Plan

"BY THE END OF 1963 at least two out of every three—possibly three out of every four—cars sold in the U. S. will be compacts," predicts George Romney, president, American Motors Corp. "We have effectively met the foreign car challenge and now can hope to regain some of our lost export market.

"At American Motors, we are now asking ourselves a fundamental Free World question: Does the present system of supplying consumer durable goods in other countries impose a severe economic disadvantage on those countries and their people?

"We are exploring several new approaches for the 18 countries where we presently manufacture our automobiles and appliances. One approach which we feel merits thorough study involves agreements for the tariff-free exchange of production between foreign and domestic companies. Such exchanges would be controlled so that the value of production flow between nations would be equal.

"Example: If a Canadian firm ships $6 million worth of convertible top mechanisms to this country, U. S. firms could ship $6 million worth of other auto components to Canada. There would be no duty charged on any of the transactions involved.

"Under the system, each country would be encouraged to turn out the product or component which it is best able to make and to develop basic manufacturing skills instead of depending on assembly alone. This would develop local industry basically and practically rather than artificially. Because (the system) would be self-controlled by the mutual character of the flow between companies, it would build equally on either side of a border. It also would extend to the consumer in each country the advantages of a total aggregate production volume which include lower costs and prices."

following the Thunderbird concept. So far, no body tooling orders can be found to support the theory, but Chrysler does have a new automatic transmission coming. Tooling on it is due Apr. 1. It conceivably could be ready for a restyled De Soto to meet the summer buying rush. Motordom thinks the story will be told in another month.

• **Engines Stopped** — Carbuilders are still weight conscious. Next year's models will be even lighter than the '61s. The industry figures aluminum engines are the quickest way to cut weight. As STEEL reported earlier (Feb. 1, p. 58), several more aluminum powerplants had been programed for 1962, but plans have been halted and tooling held up while General Motors does some problem solving. (See Machine Topics, Page 104.) Fast pouring rates are causing porosity in present V-8 aluminum blocks and heads. Reject rates are high as engineers attempt to figure out whether it's better to impregnate all blocks, drop the production rate by pouring more slowly, or find a happy compromise.

Still in the works is Chevy's H-35 project, the four cylinder aluminum engine with 190 cu in. displacement. There's a temporary stop order on it now, but STEEL sources claim it is only for minor engineering changes. The engine is expected to appear in Chevy's new compact car next fall. A new six cylinder job will follow.

You might also see a four cylinder aluminum engine in the 1962 Rambler American. Reportedly, it is a redesign of AMC's defense contracted Mighty Mite. Motordom doubts that the aluminum V-8 Ford is working on will appear before 1963.

U. S. Auto Output

Passenger Only	1960	1959
January	688,731	545,756
February	659,323	478,518
March	654,242	576,080
April	582,909	578,846
May	611,226	546,817
June	613,147	557,995
July	434,377	555,410
August	305,527	239,152
September	407,685	258,151
October	617,816	507,527
10 Mo. Totals	5,574,983	4,844,252
November		254,527
December		494,931
Total		5,593,707
Week Ended	**1960**	**1959**
Oct. 15	144,056	133,430
Oct. 22	146,339	112,488
Oct. 29	150,019	101,616
Nov. 5	145,537	63,451
Nov. 12	142,541†	64,233
Nov. 19	140,000*	68,476

Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.

This coil-fed Wean "Flying Press" line performs both shearing and blanking operations.

Massey-Ferguson saves up to $9 per ton on material costs with Wean coil processing lines

As a measure of its products' popularity, Massey-Ferguson, Ltd. of Toronto cites the fact that M-F combine and baler production fills every available Canadian railroad flat car twice a year.

Five years ago, Massey-Ferguson's production and purchasing personnel made a thorough cost study of their extensive steel demands, then being provided by shearing from purchased sheets. As a result, three Wean coil processing lines were installed to supply these requirements directly from standard coil.

The three Wean lines are: (1) an edge-trim and cut-to-length line, with a flying shear; (2) a Wean slitting line; and (3) a Wean "Flying Press" line that offers the versatility of straight or angle shearing or blanking of coil stock, all in one machine.

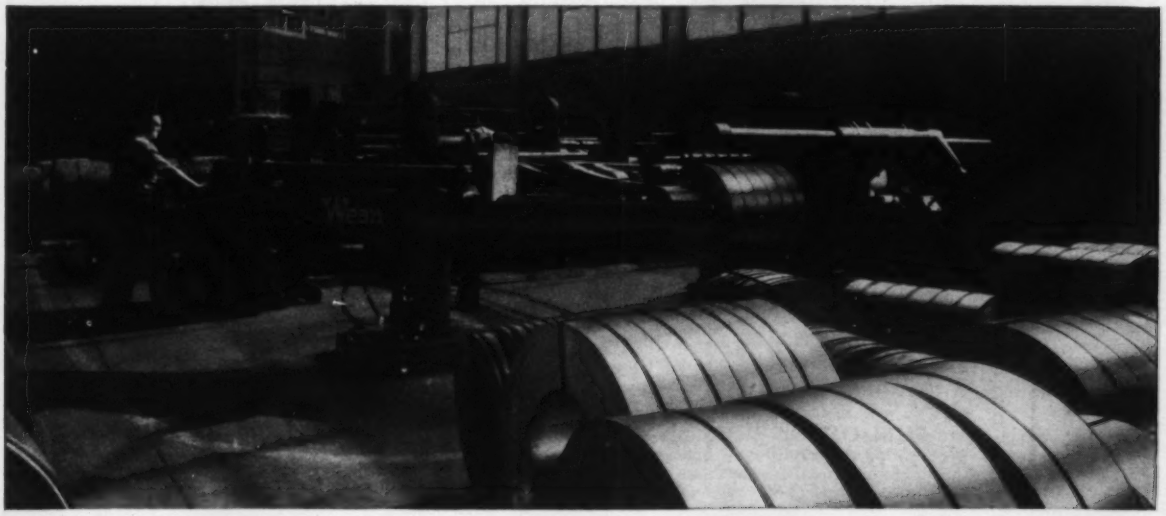
Massey-Ferguson management credits this coil processing system with savings of from $4-9 per ton of metal consumed. And besides the direct production savings in sheet supply, the threat of model-change obsolescence is removed when steel inventory is in coil form.

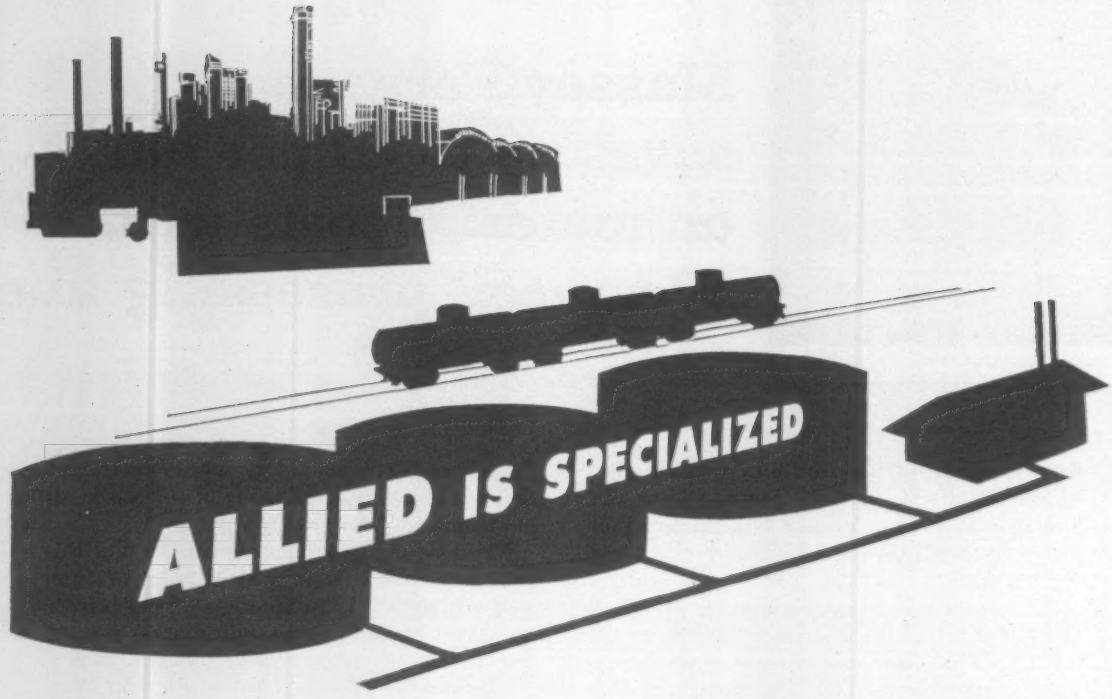
Many metalworking firms have had similar experience in the profit-making aspects of coil processing equipment. The concept and economics of coil processing are discussed in a new brochure available from Wean. Write for your copy of this informative catalog.

WEAN EQUIPMENT CORPORATION
22800 Lakeland Boulevard
CLEVELAND 17, OHIO

WEAN

Standard coils are slit to a wide variety of widths on this Wean line at the Toronto M-F plant.





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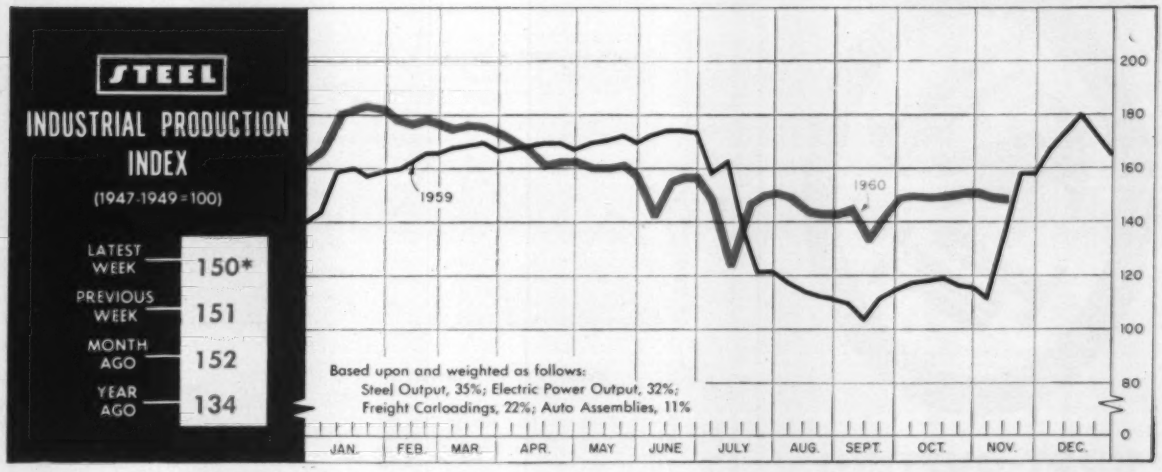


*Week ended Nov. 12.

Slowdown Shows in Industrial Areas

THE FARTHER AWAY you get from the highly populated, heavily industrialized centers, the more you are inclined to think that our economy is in a fairly healthy condition. No area is without problems, but the South, Southwest, and West seem to be better off than others.

Skipping across the nation, here is how things look:

• **East** — While business activity remains at a high level in the latest report from the Federal Reserve Bank of Philadelphia, there are signs of weakness in almost every indicator. Manufacturing production in the Third Federal Reserve District is lagging behind that of the nation; construction contracts are about 8 per cent off the 1959 pace; and department store sales are dropping. Factory employment is up relative to the national picture.

In New England, the manufacturing index of the Federal Reserve Bank of Boston is slipping at about the same rate as the national Federal Reserve Board's industrial production index. Nonagricultural employment is relatively high, but department store sales indicate some hesitancy to spend the increased earnings. Construction is strong.

If you're looking for a real bright spot in the East, try Long Island. Says the Franklin National Bank: "There's an industrial boom taking place on Long Island. It started early last year, picked up increasing momentum this year, and is still running strong." The bank's business index has shown a continuous rise since late in 1959 and now stands at an all-time high.

• **Midwest**—This area has felt the steel industry's rapid decline in second half. Business trends are less encouraging here than in any other part of the country. In Pittsburgh, the low point was reached in late September, reports the Bureau of Business Research at the University of Pittsburgh; the rise since then has brought the index back up only to

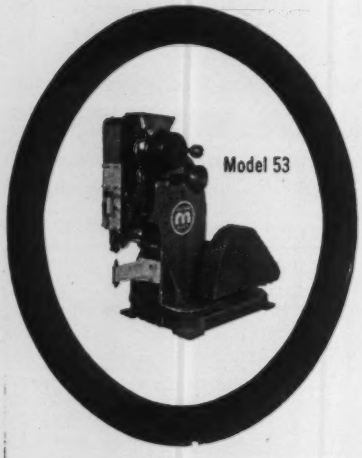
BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	1,464[1]	1,468	2,233
Electric Power Distributed (million kw-hr)	14,050[1]	13,982	13,270
Bituminous Coal Output (1000 tons)	7,910[1]	7,990	7,824
Crude Oil Production (daily avg—1000 bbl)	6,900[1]	6,940	6,876
Construction Volume (*ENR*—millions)	$314.4	$373.4	$444.6
Auto, Truck Output, U. S., Canada (*Ward's*)	171,333[1]	170,946	79,413
TRADE			
Freight Carloadings (1000 Cars)	580[1]	599	638
Intercity Truck Tonnage (changes from year ago)	+1.3%	−4.1%	+0.1%
Business Failures (Dun & Bradstreet)	317	331	265
Currency in Circulation (millions)[3]	$32,298	$32,102	$32,105
Dept. Store Sales (changes from year ago)[3]	−4%	+3%	+5%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$24,173	$29,413	$22,353
Federal Gross Debt (billions)	$290.5	$290.5	$291.0
Bond Volume, NYSE (millions)	$22.4	$25.1	$34.2
Stocks Sales, NYSE (thousands of shares)	13,743	13,462	16,195
Loans and Investments (billions)[4]	$107.8	$107.4	$105.2
U. S. Govt. Obligations Held (billions)[4]	$29.3	$29.6	$28.1
PRICES			
STEEL's Finished Steel Price Index[5]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[6]	222.4	222.5	232.1
All Commodities[7]	119.0[1]	119.0	119.2
Commodities Other than Farm & Foods[7]	127.5[1]	127.5	128.7

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1960, 2,849,306; 1959, 2,831,846. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-39=100. [6]1936-39=100. [7]Bureau of Labor Statistics Index, 1947-49=100.

COST-CUTTING PRODUCTION TEAM!

. . . the two-way answer to assembly problems!



Here's a combination that cuts production costs and gets rid of assembly problems in a hurry—Milford Tubular Rivets made to high quality standards to assure a better finished product for you . . . Milford automatic rivet-setting machines that can be quickly adapted to your particular fastening needs. Write for more information on how you can put this team to work.

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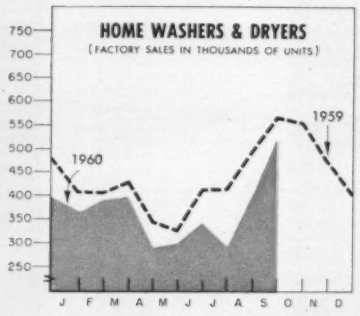
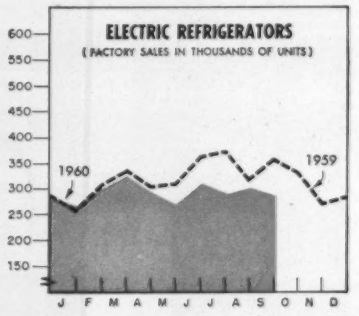
THE BUSINESS TREND



	Washers		Dryers	
	1960	1959	1960	1959
Jan.	254,565	288,491	111,603	118,220
Feb.	283,640	297,826	108,367	106,274
Mar.	305,635	329,668	90,205	98,434
Apr.	235,828	274,372	53,213	67,752
May	243,943	277,934	53,700	45,903
June	276,955	341,894	64,950	70,838
July	217,655	318,063	72,580	95,248
Aug.	296,499	359,849	105,119	133,197
Sept.	352,711	394,112	165,508	174,560
Oct.	.....	374,135	.....	179,669
Nov.	.....	312,796	.....	157,047
Dec.	.....	264,236	.....	134,633
Totals	.....	3,833,376	.....	1,381,775

American Home Laundry Mfrs. Assn.



	1960	1959	1958
Jan. ..	266,700	256,200	206,100
Feb. ..	302,400	306,200	227,800
Mar. ..	338,100	333,700	261,100
Apr. ..	294,000	301,000	210,800
May ..	268,000	308,200	262,900
June ..	308,500	361,000	316,300
July ..	291,500	370,800	279,700
Aug. ..	301,400	314,100	245,900
Sept. ..	284,900	355,700	295,200
Oct. ..	.....	329,600	277,500
Nov. ..	.....	265,900	245,500
Dec. ..	.....	282,600	286,900
Totals .	.....	3,785,000	3,116,700

National Electrical Mfrs. Assn.

Charts copyright, 1960, STEEL.

the levels prevailing in mid-1958.

In Ohio, things aren't much better. The industrial activity index of the Ohio Bell Telephone Co. has been in an almost continuous downtrend since early spring. At 139 per cent of the 1947-49 average, it has dropped almost 8 per cent since early in the year. However, the Federal Reserve Bank of Cleveland reports that building permits and new car sales are exceptionally strong in Cleveland. (Cuyahoga County — Greater Cleveland — is a good barometer for auto sales across the nation, claims Ohio Bell's economist, W. T. Diebold.)

The October report of the Purchasing Agents Association of Chicago shows downtrends in almost every aspect of business. Inventories are still dropping; employment is down; and production has dropped.

Despite the vigorous buildup in new auto production, business agents in Detroit report the fifth consecutive decline in their business conditions index during October.

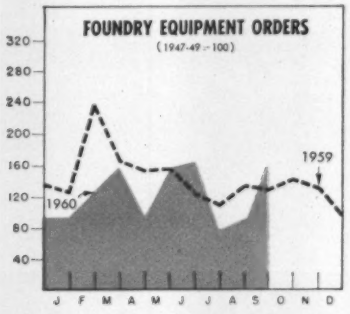
• **Central** — Unemployment in the Ninth Federal Reserve District increased this fall but at a rate only about half that for the nation as a whole, reports the Federal Reserve Bank of Minneapolis. In Minnesota, September employment was at an all-time high for the month. However, building permits and the copper mining activity in the district are weakening.

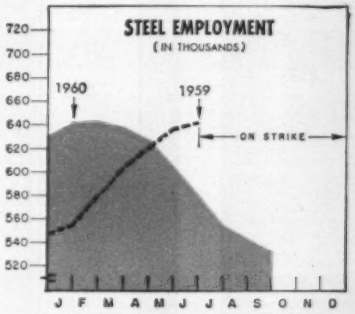
The Bureau of Economic & Business Research at the University of Utah reports: "Utah business so far in 1960 is better than it was in 1959. Furthermore, business . . . is operating at a relatively higher level than the nation's . . . for each of the last five months, nonagricultural jobs have set a record.

• **South** — In the latest report of the Federal Reserve Bank of Atlanta, slight declines were noted in such important indicators as manufacturing employment and payrolls, construction contracts, and turnover in demand deposits at member banks. But department store sales have bettered the national pace.

The Bureau of Business Research, University of Alabama, notes that "Alabama's economy joins in a national businesss trend characterized by a slight slowing in the rate of growth for the economy as a whole and an absolute slowing in the production of heavy industrial goods."

• **Southwest**—There are parts of the





	1960	1959	1958
Jan.	95.5	127.4	57.9
Feb.	128.6	237.1	57.6
Mar.	159.9	166.6	85.9
Apr.	97.9	154.2	88.7
May	159.0	157.0	136.1
June	164.8	125.1	87.7
July	80.0	110.7	77.9
Aug.	92.4	134.1	74.1
Sept.	158.1	131.3	64.5
Oct.	....	140.8	118.9
Nov.	....	131.2	83.3
Dec.	....	95.9	137.0
Avg	....	142.6	89.1

Foundry Equipment Mfrs. Assn.

	Employment in Thousands		Payroll In Millions	
	1960	1959	1960	1959
Jan.	641	555	$398.8	$335.2
Feb.	643	580	381.4	333.9
Mar.	637	604	398.8	385.4
Apr.	626	621	357.2	385.5
May	604	635	339.8	396.9
June	580	641	316.0	398.2
July	554	n.a.	287.0	n.a.
Aug.	543	n.a.	300.3	n.a.
Sept.	531	n.a.	287.2	n.a.
Oct.	...	n.a.	....	n.a.
Nov.	...	n.a.	....	n.a.
Dec.	...	548	....	400.3

n.a.=not available because of strike.
American Iron & Steel Institute.

Southwest where businessmen don't know about the recession. While the national FRB industrial production index was starting into a downtrend in August and September, industrial production in Texas was holding even with July's at 174 per cent of the 1947-49 average, declares the Federal Reserve Bank of Dallas. And in Arizona, the index of the Valley National Bank, Phoenix, continued its uptrend to a high of 238.6 (1947-49 = 100).

• **West Coast**—Business activity in Southern California edged up in September to the highest point of the year, states the Security First National Bank of Los Angeles. At 215.2 (1947-49 = 100), the bank's index has been topped only during July and August, 1959. Employment in the aircraft industry is a problem, dropping under the 1959 level by 17.4 per cent, reports the California State Chamber of Commerce. But total employment in the state is still 3.2 per cent ahead of the year-ago figure.

Contracts Hold Above '59's

Construction contract awards, one of the so-called leading indicators, continue to set a hot pace. October awards compiled by *Engineering News-Record* were the second best for that month. And so far in November, the pace is about 13 per cent above the 1959 level.

However, the barometer has only a fair record for pinpointing turns in the economy. One thing that makes it difficult to analyze the trend is that *EN-R* monthly statistics are based on complete weeks within the month, which results in an unusually jagged trend line. In addition, one or two large contracts can make an otherwise normal month into a phenomenal one and throw the trend line out of kilter.

However, it is apparent from a study of the last 13 years that contracts awards have led both downturns and upturns in the three complete business cycles since World War II by anywhere from 4 to 17 months. But they also have led business analysts astray several times, especially in anticipation of a downturn. For example, contracts declined markedly during and shortly after the steel strike last year, but they have been strong ever since, giving no indication of a coming recession in general business.

As with all indicators, this one should be used in conjunction with others in making business plans.

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■ **SOLVENT-CONTAINING DRY FILM**—This group of Houghton rust preventives includes transparent resin-based materials for permanent application; tough, dry coatings to withstand outdoor unprotected service; and dry, waxy film types for indoor storage of tools, dies, fixtures, and machinery.

■ **OILY & PETROLATUM FILMS**—This group of rust preventives ranges from light oils to hard greases. They cover needs from protection of coiled wire, bearings and packaged goods not subject to weathering to long-term outdoor storage of machinery and parts.

■ **CONCENTRATES**—These concentrates impart rust preventive qualities to oils, solvents, petrolatum and even to water. The degree of protection can be controlled by the degree of dilution of the concentrates.

Write for informative folder, "The Primary Characteristics of 14 Rust Veto Products." E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

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Wilkerson chief engineer

Frederick F. Ward, sales manager of **Arrow Tool Co. Inc.,** Wethersfield, Conn., was appointed vice president. He is responsible for sales, production control, purchasing, estimating, and engineering. He was tool buyer in the Purchasing Dept., Pratt & Whitney Aircraft Div., United Aircraft Corp.

Marquis P. Orr was appointed general sales manager, **Mackintosh-Hemphill Div.,** Pittsburgh, E. W. Bliss Co. He was manager of roll sales.

Rea Magnet Wire Co. Inc., Ft. Wayne, Ind., division of Aluminum Co. of America, appointed **Robert L. Whearley** president; **Allen C. Sheldon** executive vice president; **James L. McKinley** vice president-sales.

Fred J. Ebeling was named director of sales for **Dodge Mfg. Corp.,** Mishawaka, Ind. He succeeds **Harry A. Torson,** vice president-sales, retired.

Richard Wells was appointed purchasing agent of **Columbia Steel & Shafting Co.,** Carnegie, Pa. He has been with the Purchasing Dept. since 1956. He was with the Sales Dept.

Alvin C. Turney, former president of Mercury Engineering Corp., Milwaukee, was appointed vice president-manufacturing, **Jacobsen Mfg. Co.,** Racine, Wis.

Harold M. Marko was elected president and chief executive officer, **Soss Mfg. Co.,** Detroit. Former executive vice president, he succeeds **Samuel Soss,** now chairman replacing **Charles J. Soss,** retired. **Eugene J. Ellison** was promoted from sales manager to vice president and director of sales.

Edward G. Uhl was named to head **Ryan Aeronautical Co.'s** newly formed San Diego, Calif., Div. **William Wagner** was made vice president-public and personnel relations for the division.

W. G. Hill was named chief engineer of **Wilkerson Corp.,** Englewood, Colo. He joined the firm in 1959 as assistant engineer. He was a design engineer at North American Aviation Inc. in Columbus, Ohio.

Hermann A. Nunnemacher, former executive vice president, was elected president of **Galland-Henning Mfg. Co.,** Milwaukee. He succeeds his father, **Henry J.,** who becomes chairman.

Valley Mould & Iron Corp., Youngstown, named **Nelson R. Clark** vice president.

Joseph V. Scott was made sales manager, Stainless Steel Div., **Regent Steel Co.,** Cleveland. He was with Crucible Steel Co. of America.

Thomas H. Wakeman was named manager of plate, structural, and bar sales for **Kaiser Steel Corp.,** Oakland, Calif. He is succeeded as

FRED J. EBELING
Dodge Mfg. sales dir.

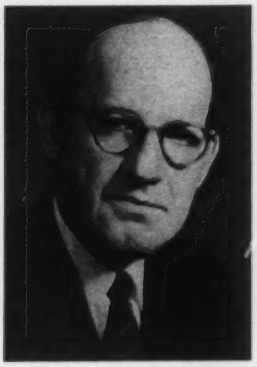
HAROLD M. MARKO
Soss Mfg. president

EDWARD G. UHL
heads Ryan Aero. div.

THOMAS H. WAKEMAN
Kaiser Steel sales post

W. O. DICK
Canton Malleable v. p.

ROBERT GALE
Eaton div. p. a.



CHARLES W. ELSTON
General Electric dept. mgr.

PAUL E. DILLBERG
Skinner-Horton Chuck sales

Kaiser's Midcontinent district sales manager by **Jack H. Webber.**

W. O. Dick was made vice president and general manager, **Canton Malleable Iron Co.**, Canton, Ohio, subsidiary of Penn Machine Co. He was production manager, Industrial Equipment Div., Baldwin-Lima-Hamilton Corp.

Robert Gale, former assistant purchasing agent, Axle Div., **Eaton Mfg. Co.**, was promoted to purchasing agent of Eaton's Marion, Ohio, Div. He succeeds **Charles D. Barnes**, promoted last month to divisional sales manager.

Arthur Sternberg, president of Solar Permanent Div., U. S. Industries Inc., was appointed assistant vice president-operations at **Fairbanks, Morse & Co.**, Chicago.

Gil Nettleton resigned as vice president at Northrop Corp. to become vice president, director of marketing at **International Telephone & Telegraph Corp.'s** Nutley, N. J., plant.

Automatic Spring Coiling Co., Chicago, appointed **Edward H. Anderson** sales manager; **Walter C. Beile** chief engineer.

J. W. Philippovic was made manager, Automation & Parts Handling Equipment Dept., at **Syntron Co.**, Homer City, Pa.

William W. Riddell and **Ralph G. Wright** were named sales managers of **Burgess Battery Co.**, division of Servel Inc., Freeport, Ill. Mr. Riddell is responsible for administrative and marketing phases; Mr. Wright for field sales operations.

Charles W. Elston was named general manager of **General Electric Co.'s** Large Steam Turbine-Generator Dept. at Schenectady, N. Y. He succeeds **W. E. Saupe** who retires at the end of the year. **Alan Howard** succeeds Mr. Elston as general manager, Gas Turbine Dept.

Charles W. Aagaard was appointed vice president-sales, **Jacobson Nut Mfg. Corp.**, Kenilworth, N. J.

Horace W. C. Rickert was made manager of materiel and **Jack Conterno** purchasing agent of **Consolidated Systems Corp.**, Monrovia, Calif.

Richard N. Vandekieft was appointed president of **Safway Steel Products Inc.**, Milwaukee, to succeed **David G. Smith**, advanced to chairman. Mr. Vandekieft was vice president-sales.

John Maher, president of **Reed Roller Bit Co.**, Houston, resigned. **Ray O. Shaffer**, chairman, will temporarily assume additional duties of president and chief executive officer.

James H. Mumper was named chief engineer of **Jessop Steel Co.** and subsidiaries, Washington, Pa. He was plant engineer.

George Greer was named manager, Virginia Div., **Electro-Tec Corp.**, Blacksburg, Va. He formerly was vice president-manufacturing, Hickok Electrical Instrument Co., Cleveland.

Leon A. Hurwitz was appointed director of the new Metals & Electronics Div., **Hamilton Watch Co.**, Lancaster, Pa.

Paul E. Dillberg was made sales manager, **Skinner-Horton Chuck Div.**, Skinner Precision Industries Inc., New Britain, Conn. He succeeds **Kenneth H. Walther**, who continues with the company as secretary and sales consultant.

Lamson & Sessions Co., Cleveland, appointed **Leo Lesnak** manager of manufacturing for Ohio plants.

Perry R. Roehm was elected executive vice president of **Barden Corp.**, Danbury, Conn. He rejoined Barden as vice president last July after having been with the firm from 1944 to 1955 as sales manager and vice president.

Paul A. Pitt was elected vice president - engineering, **Solar Aircraft Co.**, San Diego, Calif., subsidiary of International Harvester Co. **Sumner Alpert** was named manager of a new division which includes Solar's aerospace, ground support, and industrial products, with responsibility for sales and project engineering.

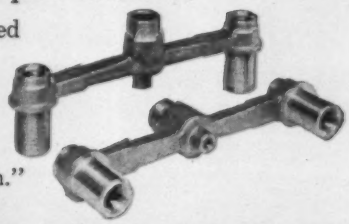
Lawrence L. Garber, vice president, **Electric Autolite Co.**, Toledo, Ohio, was named group executive, directing operations of three divisions: Automotive and aircraft batteries in the U. S. and Canada; industrial batteries; and wire and cable.

Robert B. Brackin was made manager, columbium properties, for **Kennecott Copper Corp.**, New York. He is responsible for columbium subsidiaries, Tin & Associated Minerals Ltd. in Nigeria, and Quebec Columbium Ltd. at Oka, Que.

Charles E. Searight was elected

WANTED! *Production line economies for market exploration...*

At Bardes Corporation in Cincinnati, Milt Garvin, Vice President, talked over this problem with his Cincinnati Lathe and Tool distributor. "We continually develop new plumbing products—like this faucet body which has 30 operations including drilling, hollow milling, boring, tapping and threading. We'll use a transfer machine when we hit high volume. Right now we need a machining line for low-cost, diversified small-lot production."



DELIVERED! *A low-cost machining line from standard machine tools...*

Four CINCINNATI 21" Sliding Head Drills—one 4-spindle and three 2-spindle models—were arranged in line and tooled to provide a production rate of 125 pieces per hour net on the brass faucet body. Total cost for the drilling machines only $27,500!

This type of production line is ideal for market exploration, or for testing tooling arrangements for a transfer line. When the low volume job is finished, these standard machines are ready for use on other jobs, including development of another new product!

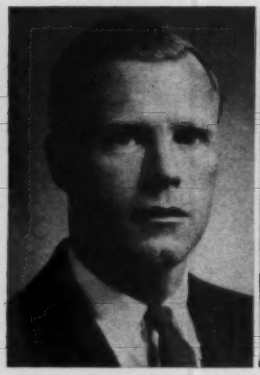
Let Cincinnati Lathe and Tool sales engineers help solve your drilling problems the cost-reducing CINCINNATI way! Call your CL&T Distributor, or write direct.

Bardes' new standard-machine transfer line for low-volume plumbing equipment.

CINCINNATI LATHE AND TOOL CO.

Cincinnati 9, Ohio

HYDRASHIFT Lathes • CINCINNATI Drilling Machines • SPIROPOINT Drill Sharpeners



CHARLES R. DeBEVOISE
Climax Molybdenum research

NORMAN SILVERBERG
Arwood West Coast sales

F. L. BLODGETT
Alloy Rods div. mgr.

RICHARD A. LOWE
Baird-Atomic gen. sales mgr.

ROY R. BUSH
Rockwell vice president

JACK B. LINN
Sparton Southwest gen. mgr.

president of **Cataphote Corp.**, Toledo, Ohio.

Richard A. Lowe was appointed general sales manager, commercial products, for **Baird-Atomic Inc.**, Cambridge, Mass. He was general sales manager of Baldwin-Lima-Hamilton Corp.'s Electronics & Instrumentation Div.

Carl A. Eversman was elected a vice president of **Globe-Wernicke Industries Inc.**, Cincinnati, and general manager of **City Auto Stamping Co.**, Toledo, Ohio, a division.

K. N. Krecke was made manufacturing manager for **Ford Motor Co.'s** stamping plants. He will direct operations of the Metal Stamping Div.'s plants in Dearborn, Mich., Buffalo, Chicago, and Cleveland, and the Dearborn tool and die plant.

Richard L. Major joined **Micro Systems Inc.**, San Gabriel, Calif., as sales manager.

Roy R. Bush, Midwestern regional manager, was elected a sales vice president of **Rockwell Mfg. Co.'s** Meter & Valve Div., Pittsburgh.

Sparton Corp. appointed **Jack B. Linn** as general manager of **Sparton Southwest Inc.**, subsidiary which will operate an electronics facility under construction at Albuquerque, N. Mex. Mr. Lynn was with Missiles & Space Div., Lockheed Aircraft Co.

Chester F. Delbridge was made product manager, welding equipment and accessories, for **Metal & Thermit Corp.**, Rahway, N. J. **Harold W. Mears** was made Northeastern regional sales manager.

Robert G. Peterson fills the new post of assistant chief engineer, Hydraulics Div., **Racine Hydraulics & Machinery Inc.**, Racine, Wis.

Clarence A. Weltman was elected president of **Alox Corp.**, Niagara Falls, N. Y. **Fred Evans** was made vice president.

Charles R. DeBevoise was appointed manager of market research for **Climax Molybdenum Co.**, New York, division of American Metal Climax Inc. He was assistant to vice president-sales, Freeport Nickel Co.

Norman Silverberg was appointed sales manager, West Coast Div., **Arwood Corp.**, New York. He was chief standards engineer, based in the New York sales office. He is now in Los Angeles.

F. L. Blodgett was appointed general manager, Hard Surfacing Products Div., **Alloy Rods Co.**, York, Pa. He was general sales manager of the company.

Edward J. Skeehan was made assistant vice president, **Sommerfeld Machine Co. Inc.**, Braddock, Pa. He was with Sawhill Tubular Products Inc.

Richard Marshall was made manager, Retaining Ring Div., **Ramsey Corp.**, St. Louis. He succeeds **Ken Walden**, who represents Ramsey in New England states.

W. L. Whittier was named works manager, and **Howard W. Cleveland** manufacturing control manager at **Douglas Aircraft Co.'s** Long Beach, Calif., Div.

John J. Lee, executive vice president of **Twin Coach Co.** in Cheektowaga, N. Y., was elected president of Twin's subsidiary, York Body & Equipment Co., York, Pa.

Glenn M. Herring was made assistant sales manager, **Hanson-Van Winkle-Munning Co.**, Matawan, N. J.

H. A. Engblom was made district manager of the metropolitan New York office of **Frank M. Weaver & Co. Inc.**, Lansdale, Pa. **Jack Warren**, former sales manager, was moved to Lansdale as chief engineer.

OBITUARIES...

Leon A. Watts, retired manager, Service & Erection Dept., **Allis-Chalmers Mfg. Co.**, Milwaukee, died Nov. 8.

William B. Carter, 48, general manager, Penco Div., **Alan Wood Steel Co.**, Conshohocken, Pa., died Nov. 3.

What a heel!

Achilles' mother was sure she had outfitted her fabled fighting son in the best of armor. She had ordered Washington Steel's ColorRold Stainless specifically for this critical purpose. No soldier in the Trojan War had been so carefully prepared for battle. But she made one fatal mistake. In fabricating the suit of armor she ran out of stainless steel and had to substitute a less noble metal for Achilles' right ankle. Paris, getting wind of this substitution, took dead aim at Achilles' heel, and down he went—not more than twenty minutes after this picture was taken.

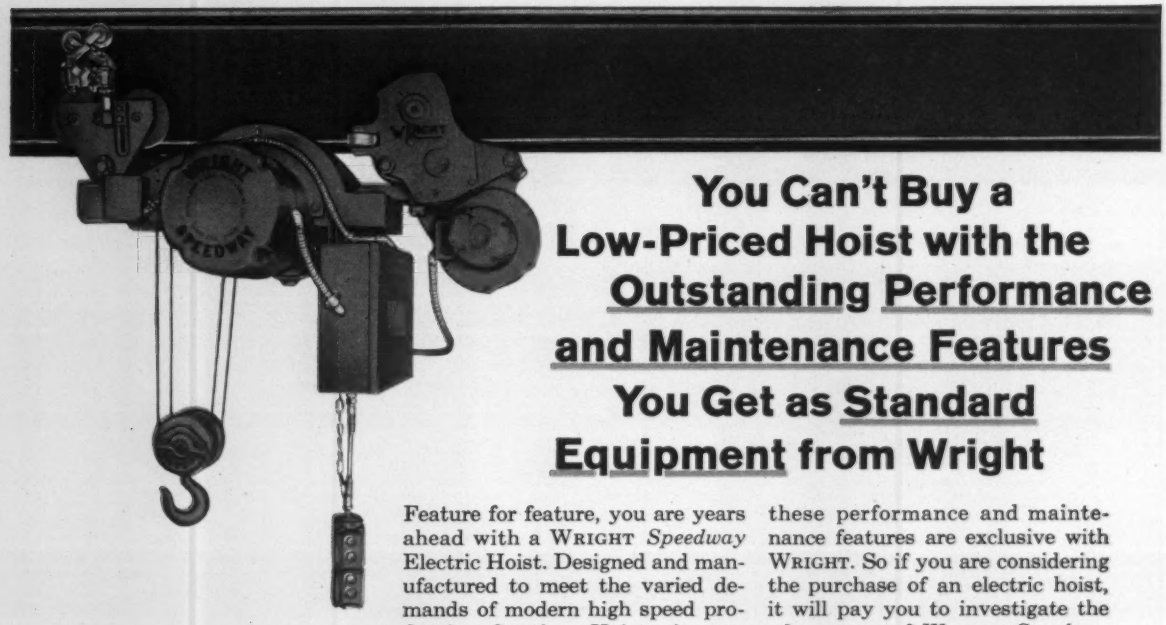
There is no substitute for stainless steel whether you are building a skyscraper, a space vehicle or a kitchen sink. Washington Steel's ColorRold stainless enables you to enhance the beauty of your quality product. Don't be an Achilles Heel—Never try to substitute for stainless steel.

WASHINGTON STEEL CORPORATION

and ColorRold®

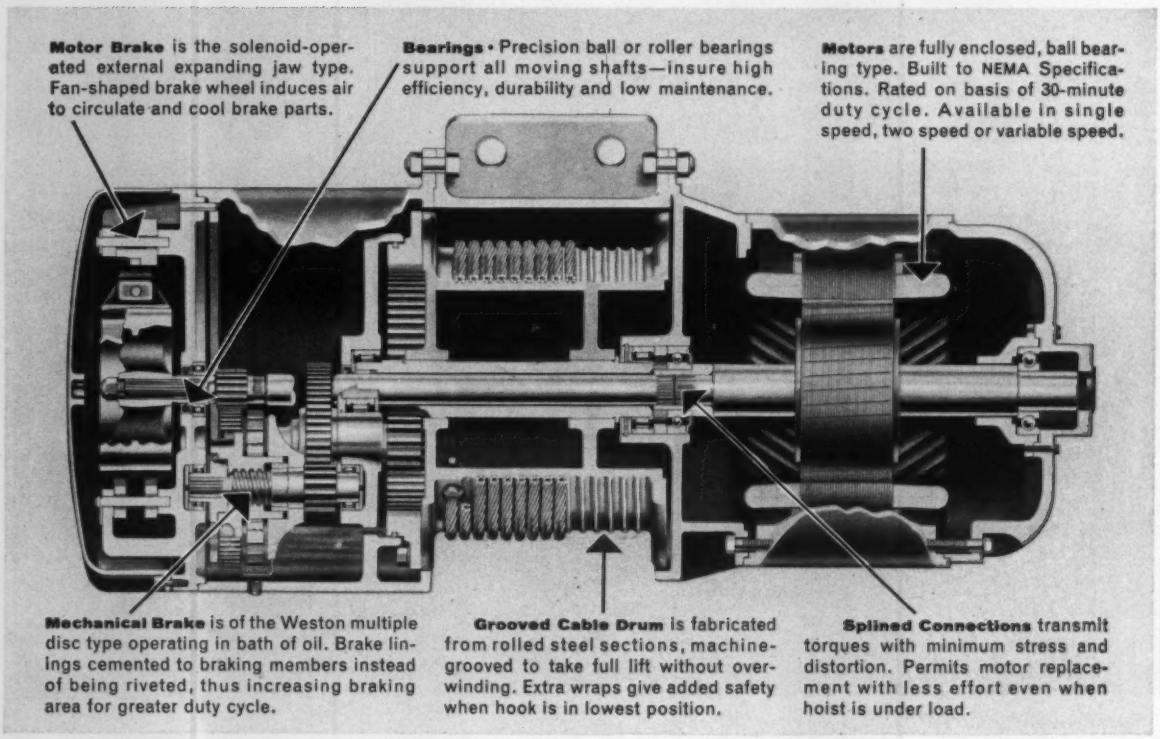
PRODUCERS OF *MicroRold®* STAINLESS SHEET & STRIP

WASHINGTON, PA.



You Can't Buy a Low-Priced Hoist with the Outstanding Performance and Maintenance Features You Get as Standard Equipment from Wright

Feature for feature, you are years ahead with a WRIGHT *Speedway* Electric Hoist. Designed and manufactured to meet the varied demands of modern high speed production, *Speedway* Hoists give you the safety, adaptability, ruggedness and efficiency which you can't get in a low-priced hoist. Many of these performance and maintenance features are exclusive with WRIGHT. So if you are considering the purchase of an electric hoist, it will pay you to investigate the advantages of WRIGHT *Speedway* Hoists. For complete information, write our York, Pa., headquarters for **Catalog E-58.**


Motor Brake is the solenoid-operated external expanding jaw type. Fan-shaped brake wheel induces air to circulate and cool brake parts.
Bearings • Precision ball or roller bearings support all moving shafts—insure high efficiency, durability and low maintenance.
Motors are fully enclosed, ball bearing type. Built to NEMA Specifications. Rated on basis of 30-minute duty cycle. Available in single speed, two speed or variable speed.
Mechanical Brake is of the Weston multiple disc type operating in bath of oil. Brake linings cemented to braking members instead of being riveted, thus increasing braking area for greater duty cycle.
Grooved Cable Drum is fabricated from rolled steel sections, machine-grooved to take full lift without overwinding. Extra wraps give added safety when hook is in lowest position.
Splined Connections transmit torques with minimum stress and distortion. Permits motor replacement with less effort even when hoist is under load.

See your WRIGHT Distributor *about the Speedway Electric Hoist line in the ¼ to 10-ton capacity range*

WRIGHT HOISTS

Wright Hoist Division • American Chain & Cable Company, Inc.

York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

ACCO

Inco Tripling Capacity of Iron Ore Recovery Plant

INTERNATIONAL Nickel Co. of Canada Ltd. will proceed immediately with the expansion of its iron ore recovery plant at Copper Cliff, Ont., tripling its capacity. The expanded plant is scheduled to be in full operation in 1963.

The project will entail an estimated capital outlay of $50 million, of which up to $10 million is scheduled for 1961.

The expanded plant will treat 1.2 million short tons per year of nickeliferous pyrrhotite high in iron content. The process to be used involves "solid state pyrometallurgical operations and the removal of nickel by atmospheric pressure leaching," says H. S. Wingate, chairman.

• **Effects Economies** — "The diversion of this large quantity of pyrrhotite to the expanded iron ore recovery plant will effect a 40 per cent decrease in the tonnage of material which otherwise would have to be handled by the nickel section of the Copper Cliff smelter. The change in practice in the nickel smelter will result in important smelting economies and provide a basis for further major advances in nickel extractive metallurgy.

"In the iron ore recovery plant, capacity for the output of iron ore pellets containing 68 per cent iron, which have established a high reputation for quality, will be raised to 900,000 short tons per year and more nickel will be recovered from the same amount of pyrrhotite than is now possible in the nickel smelter."

Dosco Plans Rolling Mill

Construction of a $40 million flat rolling mill at Contrecoeur, Que., to fill a gap in Dominion Steel & Coal Corp.'s fabricating facilities is expected to start in the spring. Engineering work has been completed and details of financing are being arranged. Some $30 million in outside capital is being negotiated. Dosco is putting $10 million into this stage of a project which ultimately will develop into a $140 million, fully integrated, steelmaking operation.

Ford Forms New Division

Ford Motor Co.'s 17 assembly plants, formerly operated by Ford Div., have been grouped into a separate Automotive Assembly Div., reports Robert S. McNamara, president. D. J. Bracken has been appointed general manager of the new division and will report to James O. Wright, vice president and group executive—Car & Truck Divisions.

Aluminum Firm Expands

Consolidated Aluminum Corp. (formerly Aluminum Foils Inc.), Jackson, Tenn., is expanding its sheet aluminum capacity 400 per cent. New facilities will include a cold, bright finishing mill and a tension roller, leveling line. Major rolling equipment is being supplied by Blaw-Knox Co., Pittsburgh; major electrical equipment, by General Electric Co., Schenectady, N. Y.

DOUBLE ACTION EXTRUSION PRESS in American-International Aluminum Corp.'s plant in San Jose, Calif., can exert pressures up to 110,000 psi on billets to force hot aluminum through openings in steel dies. The Miami, Fla., company plans to purchase two additional presses

Stelco Erects Buildings

Steel Co. of Canada Ltd. is proceeding with erection of steelwork for a new machine shop, new fabricating shop, and an electrical shop on Burlington Street, Hamilton, Ont. The three buildings will contain 97,500 sq ft of working area, interconnected by overhead galleries. A new ore dock and two new oxygen steelmaking furnaces are planned.

Fabricator Enlarges Plant

Hershman Sheet Metal Works Inc. will double its manufacturing space about Dec. 1 when it occupies the first of two buildings it is acquiring adjacent to its present plant at 12th and Dauphin Streets, Philadelphia, Pa. The firm fabricates ductwork for heating, cooling, and ventilating systems.

Stanley Offers New Line

Stanley Electric Tools Div., Stanley Works, New Britain, Conn., has entered the air driven, industrial tool field. The division is introducing air tools in the form of air routers and a 12 gage air shear.

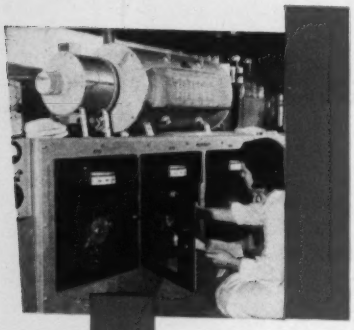
Shifts Lathe Production

Clearing Div., Chicago, U. S. Industries Inc., plans to manufacture its complete lathe line in its Hamilton, Ohio, facilities. Previously, this operation was carried on at its Chicago plant. The Hamilton plant will be in full lathe production by the end of this year and will continue to manufacture Clearing's line of inclinable and straight side mechanical presses and hydraulic presses.

Forms Electronics Firm

Shafford Electronics & Development Corp. has been organized to enter the avionics and spacetronics control systems field. Headquarters are at 2945 Nebraska Ave., Santa Monica, Calif. Officers in-

(*Please turn to Page* 88)

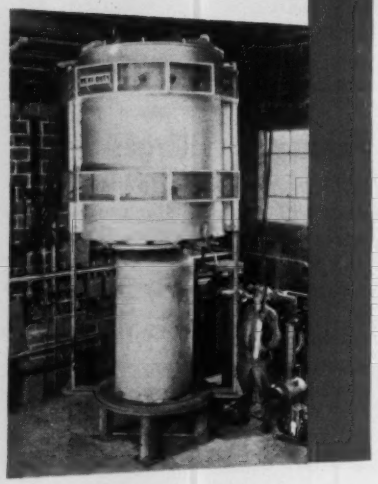


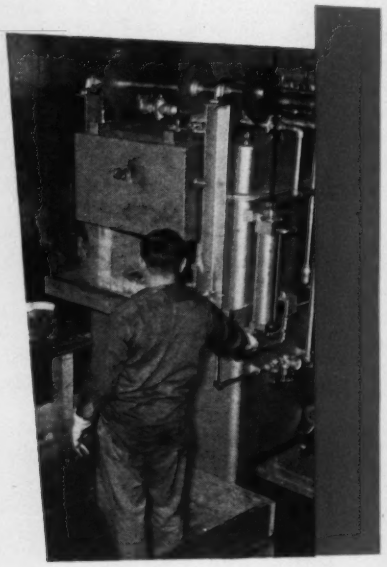
Light industrial furnaces...

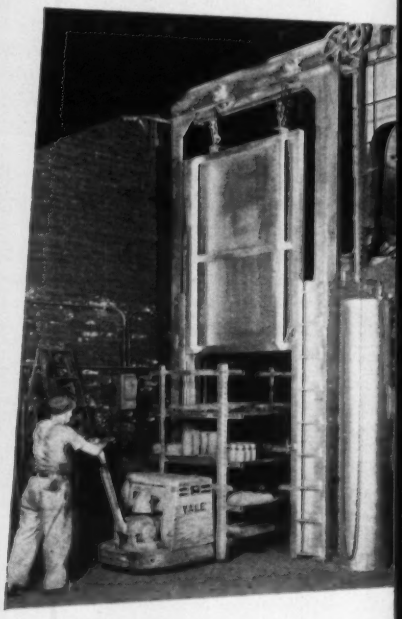
Heat treating furnaces, fuel-fired and electric...

Non-ferrous metal melting furnaces, fuel-fired and electric...

Industrial ovens, fuel-fired and electric...







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induction melting furnaces....

A full line of sizes and types for steel, cast iron, aluminum, copper, magnesium, silver and their alloys. Designed by a leading European producer of induction melting equipment and proven in hundreds of installations throughout the world. Get the full details from your Hevi-Duty sales engineer or

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Electric and Fuel-Fired
Industrial Furnaces and Ovens
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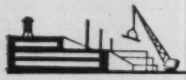
A Division of
Basic Products
Corporation
Hevi-Duty Electric Company, Watertown, Wisconsin

(*Concluded from Page* 85)

clude: President and chairman, C. A. Shank; director of sales and acting secretary-treasurer, J. P. Jacob; and director of engineering, W. L. Bowling.



NEW PLANTS

Linde Co., a division of Union Carbide Corp., New York, opened a warehouse at 7 S. Linden Ave., South San Francisco, Calif. Gases to be stocked include: Argon, helium, neon, krypton, xenon, and special mixtures of those gases.

Allis-Chalmers Mfg. Co., Milwaukee, will build a multimillion dollar engine manufacturing plant at Harvey, Ill. The firm will also expand capacity of its farm machinery plant at Independence, Mo., by 40 per cent.

Bendix - Pacific Div., Bendix Corp., is erecting a $3.7 million electronics center in the northern San Fernando Valley, California. The first building to be constructed will be used primarily for electronic production. An adjacent building will house the division's sonar testing facilities.

Deming Co., Salem, Ohio, opened its Midwest Div. plant in Rogers, Ark., for the production of commercial pumps. Production of the industrial line of pumps will be maintained in Salem. The new plant occupies 65,000 sq ft of space plus 3200 sq ft of office space.

Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y., opened a direct factory warehouse at 1700 Bancroft Ave., San Francisco, Calif. The building will contain 1000 tons of stock and a complete inventory of fastener products. The company's regional sales office, under John Boyd and Robert Blanchard, will also be at the warehouse.

Atlantic Steel Co., Atlanta, has erected a new steel service building at 4230 First Ave. S., Birmingham, Ala. The building adjoins the Warehouse Div.'s original facilities and more than triples the available storage space. Robert S. Peckham is the branch manager. The branch stocks carbon and stainless steels and aluminum products.

Reynolds Aluminum Supply Co. of California plans to build a $350,000 warehouse and office building at 24th and Haffley Streets, National City, Calif. It will contain 30,000 sq ft of space and will house the San Diego branch office and warehouse of the company which is an affiliate of Reynolds Metals Co., Richmond, Va.

Center Tool & Mold Co. is building an 8000 sq ft plant in Sandwich East Township, Ont. The firm makes steel molds for plastic compression molding and diecast dies.

ASSOCIATIONS

American Institute of Steel Construction Inc., New York, elected these officers: President, J. M. Straub, Fort Pitt Bridge Works, Pittsburgh; first vice president, H. G. Lewis, Flint Steel Corp., Tulsa, Okla.; secretary, M. H. Smedley, New York; and treasurer, E. P. Stupp, Stupp Bros. Bridge & Iron Co., St. Louis. L. Abbett Post was re-elected executive vice president, the top administrative post, J. K. Edmonds, assistant executive vice president.

Francis J. Trecker, Kearney & Trecker Corp., Milwaukee, was elected first vice president of the **National Machine Tool Builders' Association**, Washington.

National Association of Aluminum Distributors, Philadelphia, elected these officers: President, Alfred Fortier, Reynolds Aluminum Supply Co., Los Angeles; first vice president, M. B. Marsh, Marsh Steel & Aluminum Co., Kansas City, Mo.; second vice president, W. H. Lewis, Lewis Steel & Aluminum Co. Inc., Milwaukee; and treasurer, L. E. Brion Jr., Peter A. Frasse & Co. Inc., New York. Secretary of the association is R. Bruce Wall.

J. M. Rudel, Rudel Machinery Co., a division of Canadian Fairbanks-Morse Co., has been elected

ASARCO

DISTRIBUTORS for ASARCON CONTINUOUS-CAST BRONZE

ALABAMA
Birmingham
Dixie Bronze Co., Inc.
FA 4-4588
J. M. Tull Metal & Supply Co., Inc.
FAIRFAX 3-1612
ARKANSAS
Little Rock
Arkansas Foundry Company
FRANKLIN 2-6261
CALIFORNIA
Los Angeles
Kingwell Bros., Ltd.
LUDLOW 2-7427
San Francisco
SUTTER 1-0514
CONNECTICUT
Guilford
Knapp Foundry Co., Inc.
GLENDALE 3-2744
Seymour
The Derby Castings Co.
TUXEDO 8-2581
Stratford
The Ellsworth Steel & Supply Co.
EDISON 7-3317
FLORIDA
Jacksonville
J. M. Tull Metal & Supply Co., Inc.
EVERGREEN 7-5561
Miami
J. M. Tull Metal & Supply Co., Inc.
NEWTON 5-0365
Tampa
J. M. Tull Metal & Supply Co., Inc.
TAMPA 3-6741
GEORGIA
Atlanta
J. M. Tull Metal & Supply Co., Inc.
JACKSON 5-3871
ILLINOIS
Chicago
Bronze Bearings, Inc.
AVENUE 2-2337
Ray M. Ring Co., Inc.
ESTERBROOK 9-0300
Peoria
Ray M. Ring Bearing Co.
PEORIA 3-8171
Rockford
Rockford Tool & Transmission Co.
ROCKFORD 2-7711
INDIANA
East Chicago
Ray M. Ring Co., Inc.
E. CHICAGO 8020
SAGINAW 1-8660
Indianapolis
W. J. Holliday & Co., Div. of Jones & Laughlin Steel Corp.
MELROSE 1-8311
South Bend
Powell Tool Supply, Inc.
ATLANTIC 9-5578
KENTUCKY
Louisville
Williams & Co., Inc.
JUNIPER 3-7781
LOUISIANA
New Orleans
Standard Brass & Mfg. Co.
AUDUBON 1381
Shreveport
Standard Brass & Mfg. Co.
SHREVEPORT 29483
MARYLAND
Baltimore
Bronze Specialities, Inc.
LEXINGTON 9-1906
MASSACHUSETTS
Boston
Kelco Metal Products Co.
HUBBARD 2-1737
MICHIGAN
Detroit
Copper & Brass Sales, Inc.
FOREST 6-6200
Meier Brass & Aluminum Co.
JORDAN 6-3902
Grand Rapids
Copper & Brass Sales, Inc.
EMPIRE 1-6681
Kalamazoo
Bard Tool and Equipment Co.
FIRESIDE 3-2691
Lansing
Superior Brass & Aluminum Co.
IV 2-2754
Muskegon
Towne Hardware & Supply Co.
2-2651
MINNESOTA
Minneapolis
R. G. Eide, Inc.
FE 8-4846
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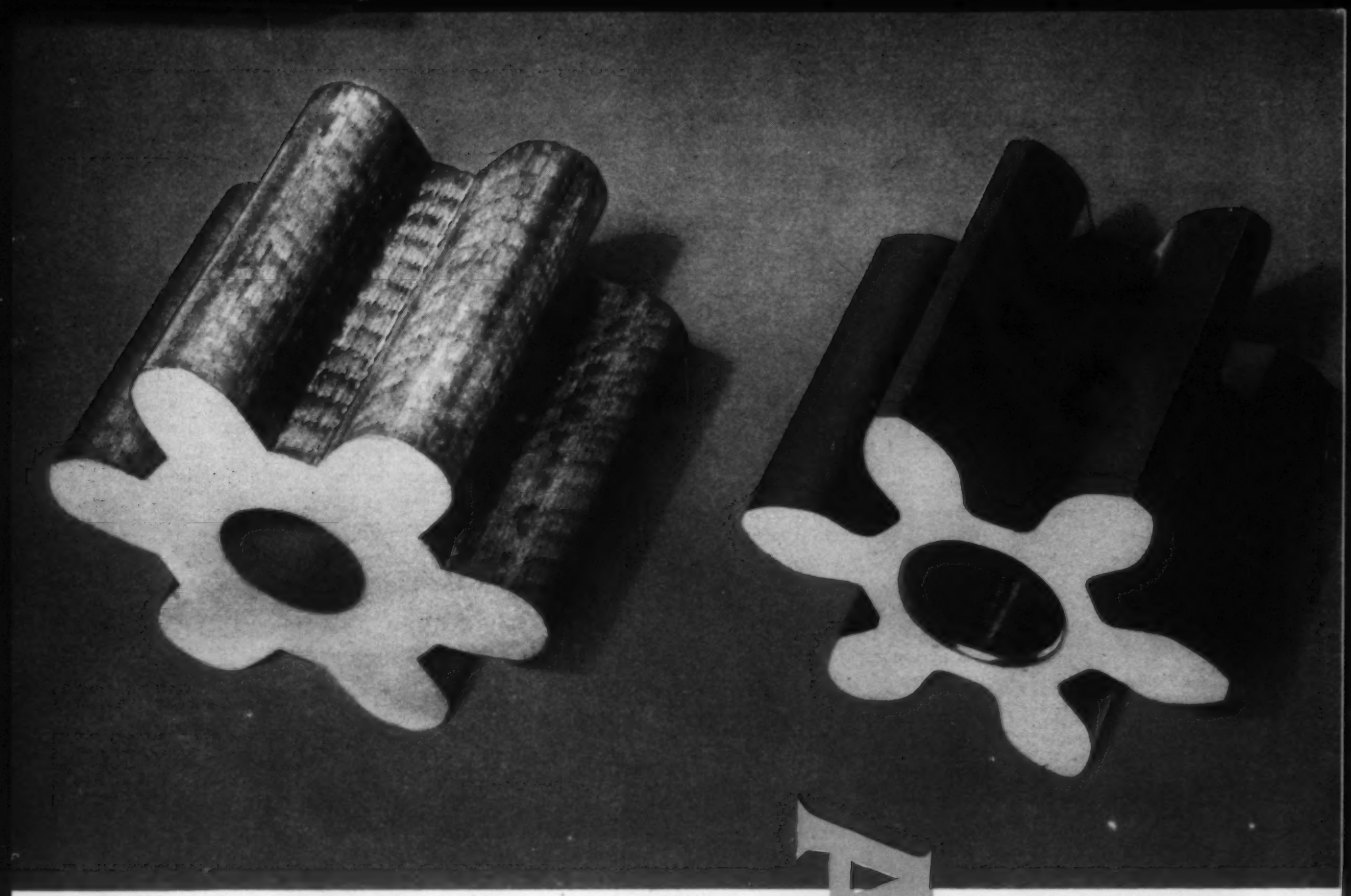
Kansas City
Associated Bearings Co.
VALENTINE 1-5393
Hubbell Metals, Inc.
BALTIMORE 1-7760
St. Louis
Hubbell Metals, Inc.
FRANKLIN 1-0212
NEBRASKA
Grand Island
The Island Supply Co.
DUPONT 2-8567
Omaha
T. S. McShane Co., Inc.
JACKSON 1273
NEW JERSEY
Carlstadt
E. A. Williams & Son
GENEVA 8-0800
MARKET 31929
(New York LA 4-9546)
Newark
Federal Foundry Sales, Inc.
MARKET 2-6330
Perth Amboy
Gregg's Brass Foundry
HILLCREST 2-2086
NEW YORK
Brooklyn
Hamsley, Inc.
STERLING 8-1144
Buffalo
Kencroft Associates, Inc.
RIVERSIDE 1520
RIVERSIDE 2020
Rochester
Ontario Metal Supply, Inc.
HAMILTON 6-1630
Syracuse
Meloon Bronze Foundry, Inc.
GLENVIEW 4-3231
Troy
The Troy Belting & Supply Co., Inc.
AS 2-4920 (in Albany 3-6121)
OHIO
Akron
Akron Welding and Spring Co.
JEFFERSON 5-2187
Cleveland
Copper & Brass Sales, Inc.
ENDICOTT 1-6757
The Bearing Bronze Casting Co.
MICHIGAN 1-6520
Cincinnati
Reliable Castings Corp.
KIRBY 1-2627
Columbus
Williams & Co., Inc.
AXMINISTER 4-1623
Dayton
The Bristol Brass Corp. of Ohio
FULTON 8185
Toledo
The Seeger Brass Company
CHERRY 8-5321
Williams & Co., Inc.
GREENWOOD 5-8661
PENNSYLVANIA
Easton
R. T. Schaller Co.
EASTON 2-2435
Latrobe
Latrobe Foundry Machine & Supply Co.
KEYSTONE 7-3341
Philadelphia
Brass & Copper Sales, Inc.
GLADSTONE 7-2500
Renewal Service, Inc.
BALDWIN 9-6330
Pittsburgh
Pennsylvania Industrial Supplies Co., Inc.
ALLEGHENY 1-5010
Pittsburgh Brass Mfg. Co.
ATLANTIC 1-8761
RHODE ISLAND
Providence
Clifford Metal Sales Co., Inc.
UNION 1-4100
SOUTH CAROLINA
Greenville
J. M. Tull Metal & Supply Co., Inc
CEDAR 3-8366
TENNESSEE
Memphis
Memphis Bearing & Supply Co.
JACKSON 6-7543
Nashville
Dixie Bearings, Inc.
CHAPEL 2-7351
TEXAS
Beaumont
Standard Brass & Mfg. Co.
TERMINAL 3-2641
Houston
Standard Brass & Mfg. Co.
CAPITOL 56531
Port Arthur
Standard Brass & Mfg. Co.
YUKON 5-9377
WISCONSIN
Milwaukee
Badger Bearing Co.
BROADWAY 2-0231
CANADA
Lachine, Quebec
Federated Metals Canada, Ltd.
MELROSE 7-3591
Scarborough, Ontario
Federated Metals Canada, Ltd.
PLYMOUTH 7-3246



Note minimum clean-up necessary between casting of this 6-tooth pump impeller and finished part. (Illustrated parts are 4" in diameter.)

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West Coast Distributor: Kingwell Bros., Ltd., 457 Minna Street, San Francisco, Calif. In Canada. Federated Metals Canada, Ltd., Toronto and Montreal. Distributors in many principal cities.

We bet millions on our couplings

When you buy a Fast's coupling, you can bet your bottom dollar everything was built on the spot, not assembled piece by piece from other suppliers. Koppers multi-million dollar manufacturing facilities are the most modern in the industry . . . with advanced program machines, highly accurate gear shapers, a complete forge shop.

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Write for
Catalog 60 and Stock List.

president of the **Canadian Machine Tool Dealers Association,** Toronto, Ont. L. G. Singer, Williams & Wilson Ltd., that city, is vice president.

CONSOLIDATIONS

Ohio Forge & Machine Corp. purchased **Cleveland Punch & Shear Works Co.** and will operate the property as a subsidiary. Both are in Cleveland. New officers of Cleveland Punch & Shear are: Chairman, E. P. Prescott, and president, C. E. Thayer. C. E. Huddleston, executive vice president, and Gerard Bastian, treasurer, will continue in those offices.

Negotiations have been substantially completed for merger of **Reynolds Metals Co.**, Richmond, Va., and **Tilo Roofing Co.**, Stratford, Conn. Tilo is a manufacturer of asbestos and asphalt building products.

Canadian Fairbanks-Morse Ltd., Montreal, Que., acquired **Howe Scale Co.**, Rutland, Vt.

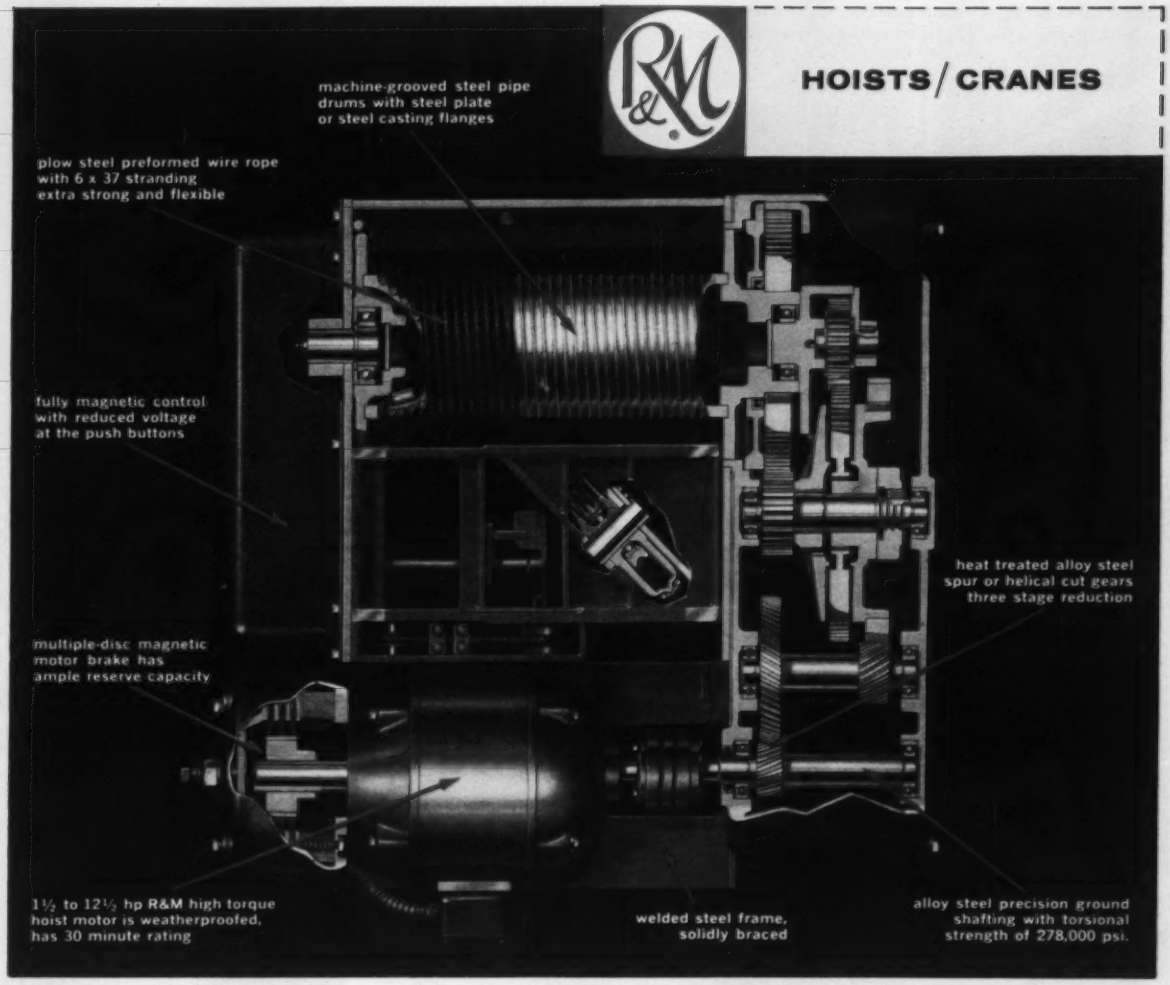
Hupp Corp., Cleveland, acquired **Horace L. Smith Jr. Inc.**, Richmond, Va., thermodynamics engineering firm specializing in radiant heating and drying. The subsidiary will be operated under the name of **Smitherm Corp.**

Udylite Corp., Detroit, is selling its subsidiary, **L. H. Butcher Co.**, Los Angeles, to **Wilbur-Ellis Co.**, San Francisco, effective Dec. 1.

Arthur D. Little Inc., Cambridge, Mass., acquired **Groton Associates**, Groton, Mass., which will be integrated into the Research & Development Div. under the direction of Dr. W. C. Lothrop, senior vice president.

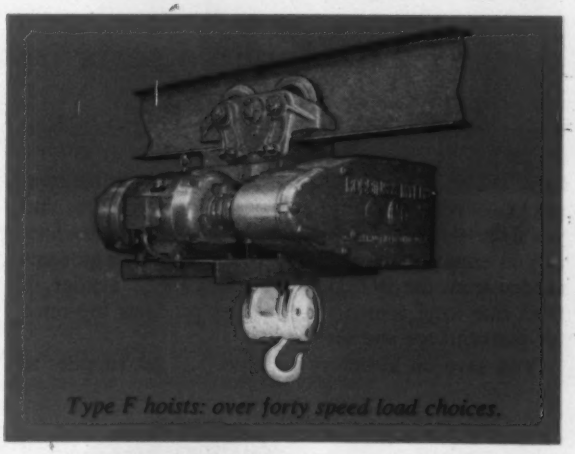
A plan to affiliate **Aeronca Mfg. Corp.**, Middletown, Ohio, with **Flight Refueling Inc.**, Baltimore, has been approved by directors. Flight Refueling produces equipment for refueling of airplanes in flight, missiles on the ground, and ships at sea.

Crane Ltd., London, purchased **Rhodes, Brydon & Youatt Ltd.**,


HOISTS/CRANES
machine-grooved steel pipe drums with steel plate or steel casting flanges
plow steel preformed wire rope with 6 x 37 stranding extra strong and flexible
fully magnetic control with reduced voltage at the push buttons
multiple-disc magnetic motor brake has ample reserve capacity
heat treated alloy steel spur or helical cut gears three stage reduction
1½ to 12½ hp R&M high torque hoist motor is weatherproofed, has 30 minute rating
welded steel frame, solidly braced
alloy steel precision ground shafting with torsional strength of 278,000 psi.

LOW HEADROOM HOIST FOR HARD USE

Robbins & Myers heavy duty Type F hoists have compact, beam-hugging profiles to save overhead space in your plant. For example, the F-2 has a headroom of only 17", yet provides 2 ton lifts on a path of steel extending from beam to hook. And F hoists are built for toughest use: frame is welded steel, alloy steel gears are heat treated, ball and roller bearings are used throughout. Weatherproof R&M 220/440 v.a.c. motors–to 12½ hp–drive through three gear reductions. These are the hoists to choose for day-after-day production lifting where maximum dependability is important. You can standardize on F hoists throughout your plant because the line is as economical as it is broad: capacities–½ to 10 tons, mounting–lug, plain or geared hand trolley, 3 types of motorized trolleys. Request Bulletin 920. Hoist & Crane Division of Robbins & Myers, Inc., Springfield, Ohio or Brantford, Ontario.



Type F hoists: over forty speed load choices.

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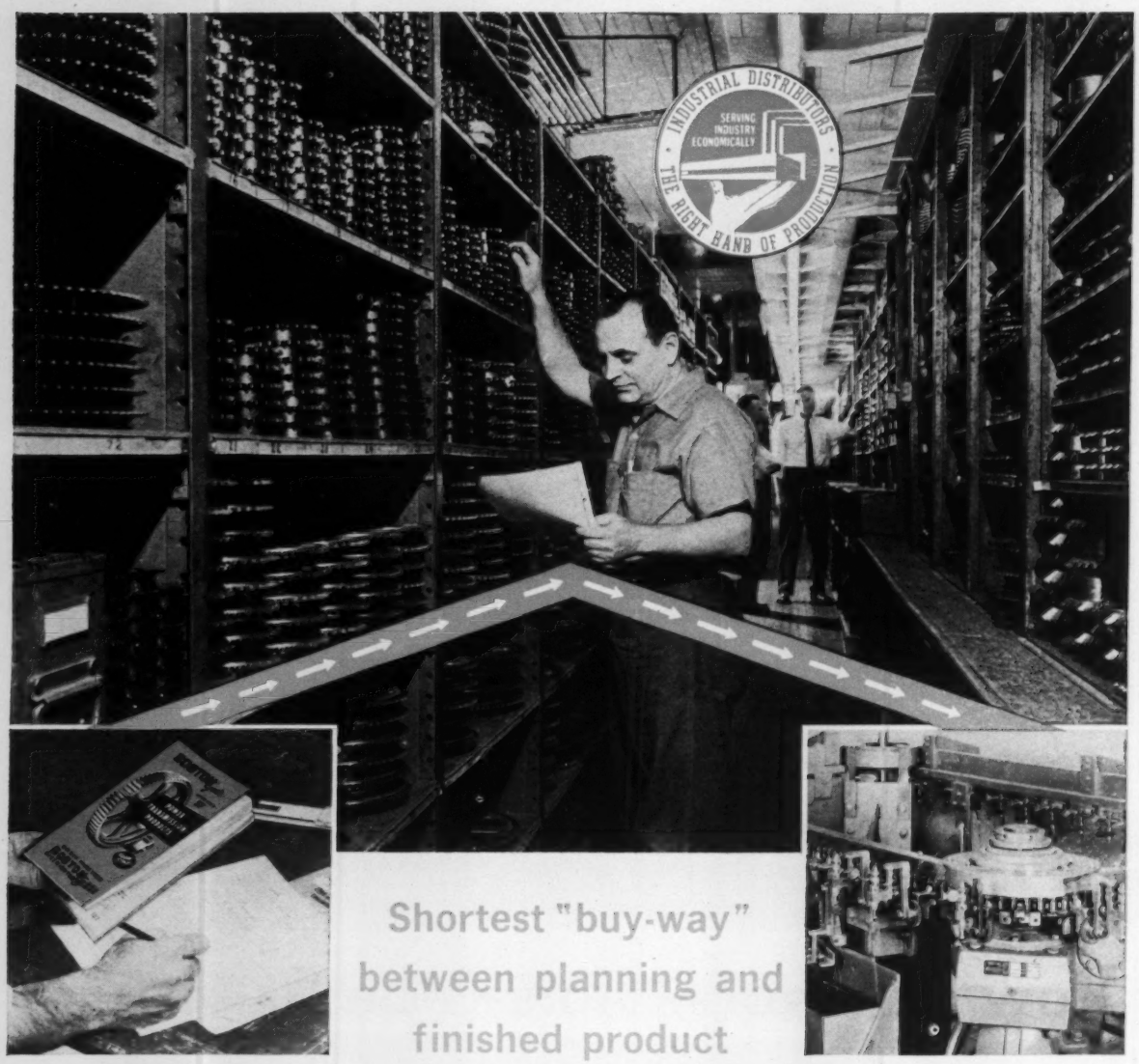

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Call your Distributor, and learn how his factory-trained specialists can make "standardization pay" most for you. Boston Gear Works, 73 Hayward Street, Quincy 71, Massachusetts. *Adv. copyright by Boston Gear Works*

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For mechanical Distributor LOOK UNDER "GEARS" in the "Yellow Pages"

— STANDARDIZATION PAYS —®

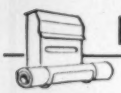
Stockport, Cheshire, England, producer of centrifugal pumps. Crane Ltd. is a subsidiary of Crane Co., Chicago.

Instrument Systems Corp., College Point, N. Y., merged with **Empire Flight Components Inc.**, Bellmore, N. Y., which will be operated as the Empire Flight Components Div. S. J. Busch is general manager of the division and vice president of the corporation. ISC has established an Electronics & Microwave Div. under the direction of Joseph Star, vice president.

NEW OFFICES

Black & Decker Mfg. Co., Towson, Md., opened a new factory service branch at 10708 South Western Ave., Beverly Hills, Chicago 43, Ill., with E. E. Huff as active service manager.

Heavy Military Electronics Dept., General Electric Co., opened a district office at 1064 Poquonock Rd., Groton, Conn. R. B. Southwell has been named manager of the newly established district office at New London, Conn.

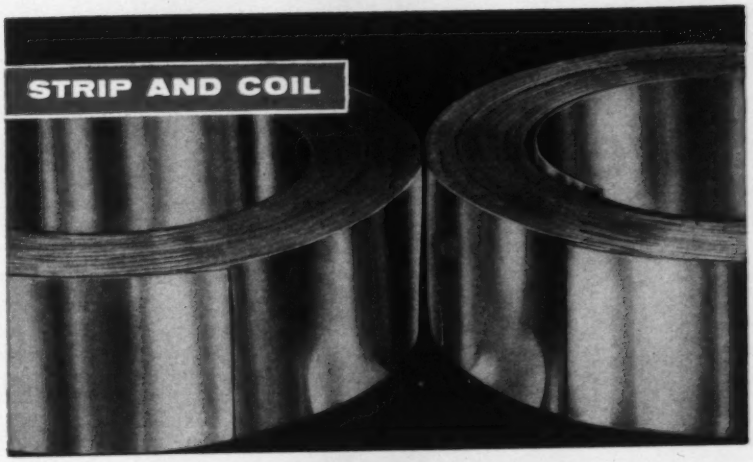


NEW ADDRESSES

Pacific Coast Div., Bethlehem Steel Co., moved its Seattle offices to 4045 Delridge Way. Only the company's fabricating works (8501 E. Marginal Way) and industrial fastener offices (3800 Iowa St.) remain at their old locations. W. J. Bolton is general manager of the Seattle plant.

Crescent Metal Products Inc. transferred three separately located manufacturing and office facilities into a remodeled 150,000 sq ft plant at 12711 Taft Ave., Cleveland, Ohio. The company makes mobile food handling and service equipment.

Pekay Machine & Engineering Co. Inc. moved to a new plant at 2520 W. Lake St., Chicago 12, Ill. About 30 per cent more space is available than in the previous plant.



MILLER OFFERS YOU

ONE-SOURCE SERVICE

ON SPECIALTY ITEMS

Long a leader in the tailor-made production of brass, bronze and nickel silver strip, Miller now offers the same expert technical help . . . the same meticulously produced high-grade metal . . . the same dependable delivery schedule on copper and copper-alloy tube in special shapes and sizes. And, as always, "phosphor bronze is the main line—not a side line at Miller."

ROLLING MILL DIVISION
Meriden, Connecticut

miller SINCE 1849

Tube Subsidiary
A. H. WELLS, INC.
Waterbury, Connecticut

Great Lakes puts the heat on

A constant drive to hammer down production costs and deliver finished stock which customers will order a second time (or a twentieth) is apparent in the way the Great Lakes Steel Corporation "puts the heat on" their ingots, slabs, and coiled strip.

Fast heating shortens the time between ingot and strip. Uniform temperatures through the steel result in improved slabbing and rolling. Consistent annealing produces strip with the formability which reduces customers' costs. Great Lakes' selection of Surface equipment on existing facilities performing these heating jobs is justified by the fact that no other supplier has applied heat in so many ways—wherever metals are produced or worked. You are invited to make the most of this great fund of heating technology. Surface Combustion, 2408 Dorr Street, Toledo 1, Ohio.

Surface®

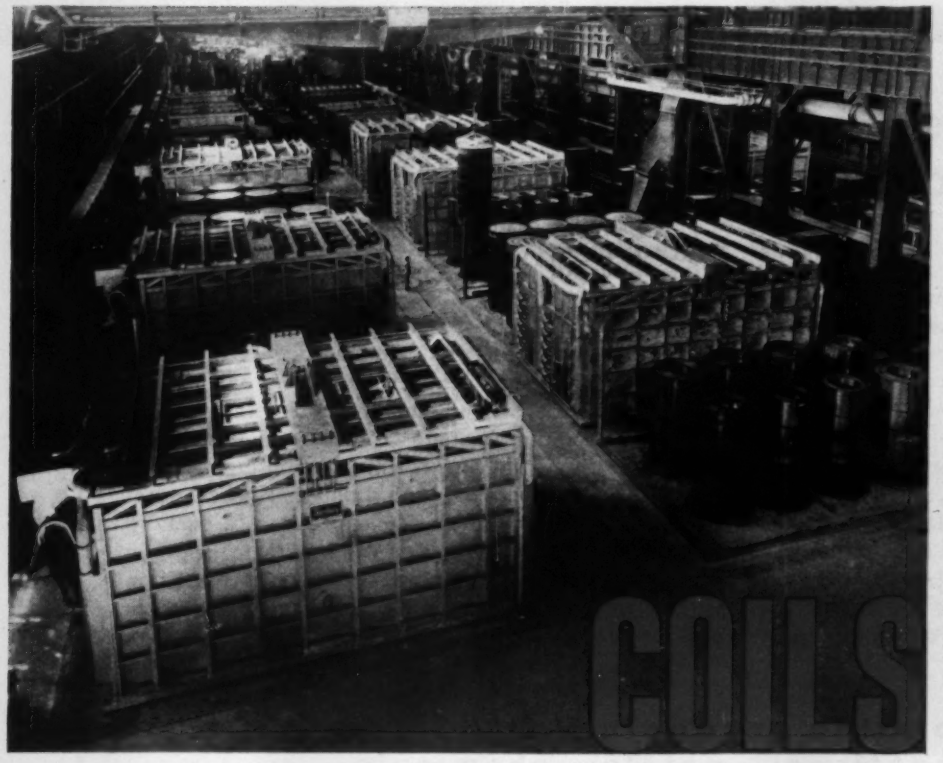
A division of Midland-Ross Corporation MR

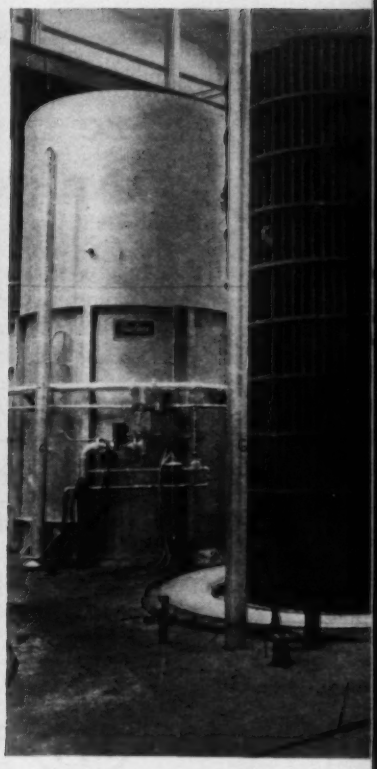
Worldwide engineering and manufacturing facilities through associates

Forty Surface recuperative soaking pits, one-way, fired from the top.

Four Surface continuous recuperative slab heating furnaces, each with three zones.

in Australia • Belgium • France • Germany • Great Britain • Italy • Japan





Forty-four Surface multiple stand annealing furnaces with 108 bases; right: forty-six Surface single stand annealing furnaces with 116 bases.

Where they "break in" your car pistons ...a tank of M&T tinning chemicals

A simple step at the factory does more to "break in" pistons properly than careful new car driver habits. When immersed in a solution containing M&T potassium stannate, the aluminum is tinned readily, uniformly. The thin, soft tin coating overall has a lubricating effect . . . it wears in without galling or seizing at tight, sliding contact areas. Engine life is better protected right from the start.

This is just one M&T tin process among many. Copper, brass and steel can also be chemically tinned by immersion alone.

For *electroplating* of tin, M&T "High Speed Tin" gives the fastest electrotinning rate possible today. For other industrial needs, practical and easy alloy plating of M&T tin-zinc, tin-nickel and bronze (tin-copper) offers excellent corrosion protection and valuable production benefits as well.

M&T is a leading manufacturer and supplier of sodium stannate and potassium stannate . . . essential ingredients in tinning. As the company that has both the specialized chemical know-how and plating experience to back up its service, M&T is best qualified to help you with any problems pertaining to the deposition of tin. Ask for an M&T plating engineer to survey your needs.

M&T **plating products** • welding products
coatings • metals • chemicals

METAL & THERMIT CORPORATION, General Offices: Rahway, New Jersey
In Canada: M&T Products of Canada Ltd., Rexdale, Ontario

SUPERDETECTOR— A new method of determining miniscule quantities of rare earths depends on yttrium as an internal standard. It separates interfering ions by electrolysis and an ion exchange column. In some cases, the method can detect concentrations of only 0.07 part per million, says Spectrographic Laboratories Inc., Cleveland, which developed the technique.

SUPERSPEED STUDY— Wind tunnel studies of practical configurations for a plane that will travel nearly 4000 mph are underway. The program will take 18 months, cost $1 million, says Aerojet-General Corp., Azusa, Calif., a subsidiary of General Tire & Rubber Co.

BRITAIN CITES OXYGEN GROWTH— In addition to its daily oxygen capacity of 1125 tons, the British steelmaking industry has another 2342 tons on order. The new installations are expected to be on stream by 1962. Forecast for mid-1960s: 5000 tons a day, or 1.8 million tons a year, says the British Iron & Steel Federation.

CHEAPER HOT TOPS— A Czech steel mill reports saving $3 million a year by using ingot hot tops made with the sodium silicate-CO_2, sand hardening process. Production costs are less than those of burned clay types previously employed. Ingot yield has been increased.

LIGHTING COSTS— Studies of average lighting installations made by Westinghouse Electric Corp., Pittsburgh, show that costs break down like this: Power 75 per cent, maintenance 15 per cent, lamps 10 per cent. Since power and labor rates are fixed, lamp selection offers the greatest opportunity for savings, the firm claims.

SOLVES TIGHT SQUEEZE— Here's a simple way to remove or mount large bearings on shafts: Machine a small groove in the shaft. Connect it with a drilled oil passage. By introducing oil under pressure, a thin film spreads between shaft and bearing race. Contact surfaces are thus separated except for narrow zones at each side where resistance to expansion tends to be greater (it's a kind of natural oil seal). Under such conditions, bearings literally "pop off," claims SKF Industries Inc., Philadelphia.

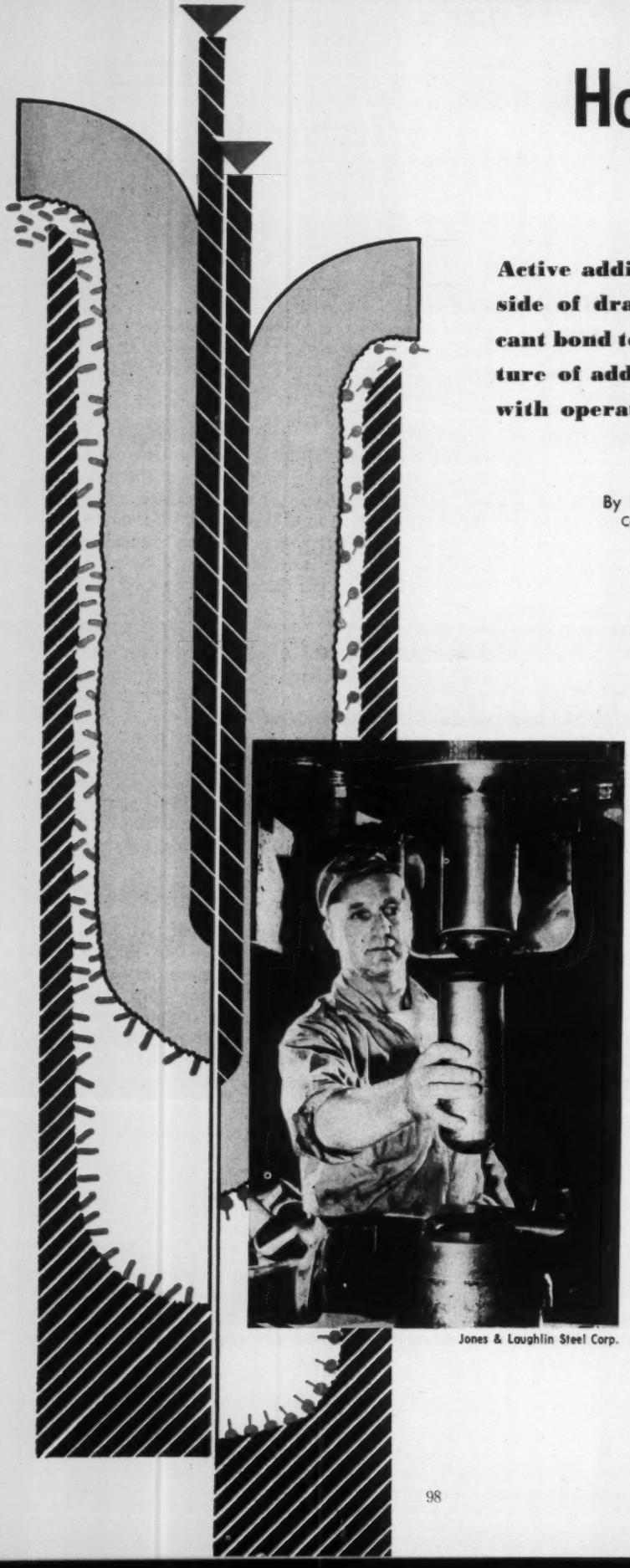
MORE WIRE FOR TIRES—Look for wire reinforced tires to capture a bigger share of the market. About 6 million lb of wire are used annually in tires for trucks, buses, and off-the-road vehicles. One industry expert expects volume to double by 1962 and reach 40 million lb by 1970. "Such tires may outlast the car," he says.

GOOD AT 1000° F— A new, temper resistant steel has a high strength-to-weight ratio up to 1000° F. After tempering at 1050-1250° F, it has tensiles of 250,000 to 300,000 psi, claims the developer, Armour Research Foundation of the Illinois Institute of Technology, Chicago. Stress-rupture data indicate high stress resistance for extended periods at 800° F. An unusual characteristic: The steel age hardens during tempering after having been air cooled to obtain a bainite microstructure.

THE BIG EYE— An x-ray machine that will "see" through steel more than a foot thick is being built by High Voltage Engineering Corp., Burlington, Mass., for A. O. Smith Corp., Milwaukee. The 8-million-electron-volt linear accelerator, called Linac, will furnish photographic proof of the soundness of such metal structures as core barrels for nuclear reactors and high pressure vessels for the petrochemical industry.

SPHERE OF UNIFORMITY— A new process for the production of spheroids with a close tolerance on size has been patented. It's designed for the production of particles of metals or alloys used in transistor manufacturing. The predictable size eliminates sieve or roll grading. Punchings or platelets are made from uniformly thick ribbons, fed into a column of liquid hot enough at the top to melt the alloy, cool enough at the bottom to permit solidification.

How to Pick the



Jones & Laughlin Steel Corp.

Active additive (blue, on right side of drawing) helps lubricant bond to metal surface; nature of additive needed varies with operation

By FRED M. ARNOLD
Consulting Metallurgist
Los Angeles

UNDERSTANDING the principles of lubrication for forming can be a dollars and cents proposition. You can get by without a detailed knowledge of chemistry, if you remember:

- Lubrication for metal forming is different from that for bearings.
- The nature of the metal surfaces involved is important.
- Good lubricants minimize metal-to-metal contact, as well as lubricate.
- Additives to lubricating oils must be more active as pressures increase.
- Chemical coatings on the metal may add to a lubricant's effectiveness.

• In the lubrication of bearings, a thick film of oil is present and is constantly renewed—pulled in by the rotating or sliding member. (The process is called viscous lubrication and depends on hydrodynamic laws.)

Those conditions don't apply in metal drawing. Movement is slower; pressures are higher; and it is not usually possible to force the lubricant into the contact area. As a result, peaks of surface roughness (asperities) tend to touch; the protective film is squeezed out and broken at many points. The condition (inability to renew the lubricant film) is called boundary lubrication.

Right Forming Lubricant

Whenever a part is to be drawn or formed, similar conditions exist. Unless an adequate lubricant has been chosen, tripping of the press will lead to welding or galling, ruining the part. Worse, the tools used, or even the press itself, may be damaged if lubrication fails.

What to do?

A lot of effort and dollars have been spent on trying to answer that question. It has been found that the selection of the right lubricant is of paramount importance.

• How the particular lubricant functions depends on the nature of the metal surfaces involved. The surface also determines some of the problems connected with forming.

The atoms at a metal surface are not bound to neighboring atoms as are those beneath. They have unsatisfied bonds which are ready to combine with almost anything in contact—which can be water, pickling residues, inhibitors, or just plain dirt. But they can be made to combine, in varying degrees, with drawing lubricants; the surface must be freed from contaminants if the lubricant film is to adhere.

The same active surface atoms play a prominent role in cold metal welding, often called pickup, loading, or galling. The surface of the metal to be formed, and that of the dies, is far from smooth. In fact, in terms of atomic dimensions, it is exceedingly rough. Ridges and valleys extend in all directions over the rough terrain. In forming, the ridges of the tool and the metal being worked come into close contact; their small area compared with the total makes the contact pressure so high per unit area that welding may result. And the active surface atoms give an eager assist to welding. Similar atoms, such as those in a steel workpiece and a steel die, are more prone to weld than, for example, the zinc and copper in brass would be to weld to steel.

• An effective lubricant for metalworking must take the characteristics of the surfaces into account and

Lubricants Used in Steel Forming

Operations are arranged in increasing order of cold work, pressures encountered, and strength of film required. Lubricants are in order of increasing effectiveness and probable cost.

BENDING

Usually no lubricant required.

FORMING through rolls or simple dies; metal not restrained.
Petroleum oils, alone or as emulsions.

DRAWING of flat stock; involves reduction of area and thickening of stock. Severity of draw and restraint will vary.

FOR SIMPLE DRAWS

Water emulsions of petroleum oils.

Water emulsions of petroleum oils containing fatty acids, fats, soaps, or combinations.

Petroleum oils and greases.[1]

FOR INTERMEDIATE DRAWS

Petroleum oils, greases, pigmented.[1]

Fatty oils, greases, soaps.[1, 2, 3, 4]

Pigmented fatty oils, greases, soaps.

FOR DIFFICULT DRAWS

Sulfonated & sulfurized oils.[2, 4]

Chlorinated oils.[2, 4]

Film of dried sodium-tallow soap.

FOR VERY DIFFICULT DRAWS

Separating films, plus oils, soaps or other means of increasing slipperiness. Reacted surface coatings, such as oxide, sulfide, phosphate (usually zinc-iron phosphate).

Metal coatings over base metal,[5, 6] such as copper, lead.

Pigments: Chalk, clay, lithopone, mica, zinc oxide, graphite, molybdenum sulfide, lime, stearates. Commonly used mixed with greases and soaps; cost frequently determines choice.

SPINNING, FLOW TURNING

Semisolid materials: Greases, pigmented greases, soaps.

IRONING: Clearance between punch and die is less than thickness of stock. Applies to tubes as well as cup type shapes.

Grease made from reactive oils, plus pigments.

Dry sodium-tallow soap.

Phosphate coat, soap reacted.

EXTRUSIONS: Frequently a high percentage of cold work.
Lubricant same as for ironing.

1. Various viscosities.
2. May be diluted with petroleum oil.
3. Mixture of these.
4. Can combine with surface atoms to form metal soaps.
5. Oil or soap is invariably used with these.
6. Used in special cases.

combine two properties: It must form some kind of layer to prevent welding contact and must provide slipperiness to lower the friction between surfaces.

Simple petroleum oils are of little help in metal drawing because they do not satisfy the requirement for forming a separate layer. Their molecules are chemically saturated; they do not form intermetallic compounds or strong adsorbed films on the metal surface. They do meet the slipperiness requirement and are extensively used in the form of oils, greases, and emulsions as carriers for other chemically active oils and pigments. And they help to make many materials practical from a cost basis.

To provide the nonmetallic separating layer, chemical activity is used; it's important in all but the simplest forming operations. Earliest of active materials were animal and vegetable fats and oils. They will combine with alkali metals like sodium to form soaps. But they also combine, in a similar way, with the surface atoms of many metals; to the chemist, the resulting products are also called soaps. When these fats and oils were the best lubricants available, metal forming was correspondingly restricted.

Today's synthetic materials provide more active chemicals to form more firmly anchored layers. The oils themselves may be synthetic, and they are reacted to form sulfonated, sulfurized, and chlorinated compounds. More effective than simple fats, they are frequently referred to as EP, or extreme pressure, lubricants. And they are often highly effective as a small portion of a composition based on petroleum or other oils.

• The EP materials are usually long molecules with an acidic (or active) group on one end. These groups attach tenaciously to the surface atoms of the metal, forming a layer of molecules standing perpendicular to the surface. The greater the activity of the molecules, the stronger the layer and its bond.

The layer is a true metal soap in some instances and somewhat similar when sulfonated, sulfurized, or chlorinated compounds are used. They form an effective separating layer.

The oil molecules above the "soap" layer are randomly oriented chains, intertwined and loosely held. They reduce friction and provide a reservoir of fresh active molecules to bond to new metal surface as it is formed during the draw.

• For higher pressures, dry soaps or solids may be used.

As the local pressure used in a metal forming operation increases, a point is reached where all liquid and most fluid compounds like the pigmented greases are squeezed out. If parts are to be produced under these conditions, a material must be found that will not be pushed out.

One of the simplest and most effective is a coat of a sodium-tallow soap. It is applied as a hot solution, then parts are dried to produce a powdery coating. During forming, the high temperature and pressure created at the working face cause the soap to react with the surface of the workpiece and become fluid. The fluid film provides the necessary slipperiness. A thin film of soap remains after great reductions have been taken. Waxes have been shown to be less effective than sodium-tallow soap because they normally contain no unsaturated molecules, cannot form separating layers that bond to the surface. Solvent solutions of waxes tend to leave thin coats.

Pigmented materials have also been used, though pigments as such are poor separating agents. But in the drawing of bars, shapes, and wire, where the lubricant is pulled in continuously, pigments are widely used as the separating media when mixed with oils, greases, or soft soaps. Lime is especially valuable in wire drawing. Pigmented greases are used in the forming of stainless steels which resist the formation of surface films.

Nongalling metals may be used as separating media. Replaceable cylinder liners were copper plated for ironing by one major automotive manufacturer at a time when technology was less advanced, but copper plating or lead coating of stainless wire for drawing is common. And a lead coating, applied by dipping in molten lead, was used by one manufacturer for all the draw stages in the mass production of 40 mm steel cartridge cases.

• Chemical treatments are used to form nonmetallic coatings on work surfaces. They include oxides, oxalates, sulfides, and phosphates.

Although oxides are usually abrasive, and hence to be avoided, they permit draws on rough work without pickling. And the adherent oxide obtained by annealing of stainless steel prevents galling in many redrawing operations; oxalates on stainless form a less abrasive coating.

Treatment of steel with hot sulfurized tallow causes a formation of iron sulfide on the surface. Other and more effective treatments are now available.

Development of phosphate surface treatment for metals has been a great advance. Heated solutions are used to form a crystalline layer of zinc-iron phosphate. It is usual to treat the phosphated parts in a soap solution to form a reaction coating of stearates over the phosphate coat. On such parts, oils and similar materials are not usually needed to provide slipperiness. In operations like tube drawing, the use of phosphate coating has permitted great reductions, cut tool wear and pickup or loading.

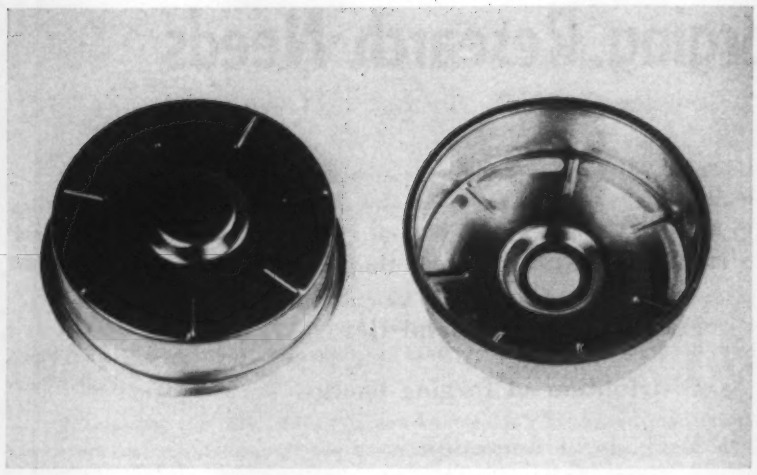
• In the table on Page 99, cold working operations have been listed with the appropriate lubricant.

Factors influencing the difficulty of working metal include its structure, yield strength, the rate of strain hardening, and the amount of cold working.

Lubricants are listed under each operation in the order of their increasing efficiency for drawing of steel. Usually, the same lubricant can be used for the same operation when other metals are being drawn. With metals easier to draw, fluid lubricants can usually be found.

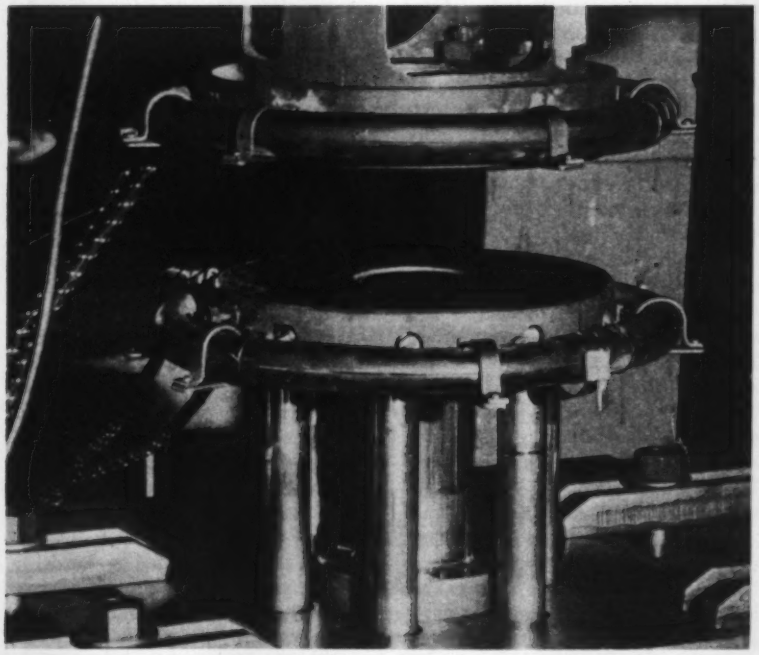
Knowledge of the types of lubricants offered by suppliers helps in selection. But under extreme conditions, all factors must be carefully evaluated. Often a lubricant is condemned when the fault may be in tool operation or design.

And on short runs, it may be simpler to endure a small amount of "trouble" rather than to go to the added expense of coating tanks for dry soap or phosphate processing.



This 0.032 in. magnesium part was reduced about 40 per cent at 50 fpm on a standard mechanical press. Rate: 35 strokes a minute

New Technique Promises Faster Magnesium Forming



Cupping tools for cups 3 in. in diameter illustrate the method of heating to 400° F. Draw ring pressure is maintained pneumatically on bottom bolster

MAGNESIUM sheets can be deep drawn on a regular mechanical press at moderate temperatures with normal lubrication.

Those conclusions are reached in a study of the metal made by E. W. Bliss Co., Canton, Ohio, and Dow Metal Products Co., a division of Dow Chemical Co., Midland, Mich.

The information gained is expected to cut the cost of converting flat sheets into deeply drawn parts.

• Two magnesium alloys were tested; 3 in. test cups were drawn up to 59 per cent in one stage. Walls had a yield strength of 38,000 to 42,000 psi.

Ordinarily, ZE10A-O and AZ31B-O magnesium alloys can be given a 70 per cent draw, but it requires hot dies, graphite lubricants (they are hard to remove), and a low draw speed.

Only 400° F is needed for the Dow-Bliss method. It employs a dry film lubricant (soap, for example), and draw speeds up to 50 fpm in a 100 ton mechanical press. At such temperatures, drawn parts are easier to handle, won't scale or discolor, says the Dow-Bliss team.

• Earing tendency, wall thinning, and dimensional variations of drawn cups are measures of drawing quality used in the tests.

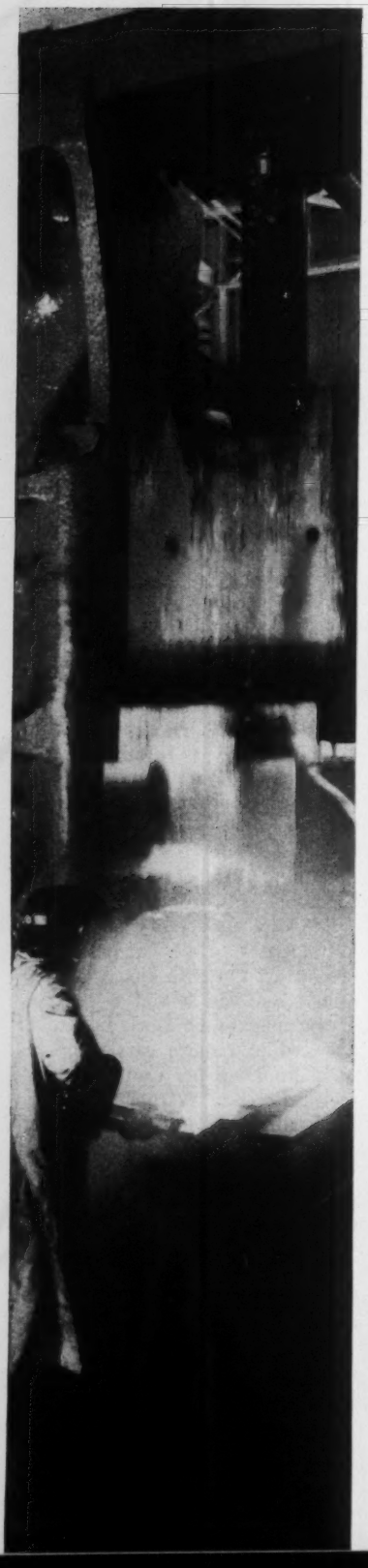
Sheet directionality affects earing (wavy edges of drawn cups) which can be objectionable because troughs are often a source of cracks. Trimming them cuts efficiency, increases costs.

Drawing quality of the magnesium appears to be comparable in several aspects with that of aluminum. Between 5 and 8 per cent of the magnesium stock had to be trimmed to remove ears compared with around 6 per cent for aluminum. Eccentricity ranged between 0.005 and 0.012 in., again comparable with the aluminum test sheets. Wall thickness remained within plus or minus 15 per cent of the original thickness.

Over-all surface quality, a measure of lubricant effectiveness, was found excellent for both magnesium and aluminum.

The 100 ton mechanical press employed in the tests has a 6 in. stroke; blankholder pressure was obtained from a pneumatic die cushion mounted in the press bed.

Expert Cites Forging Research Needs



The industry can increase its production by studying:

- **Fundamentals of metal flow.**
- **Distribution of forging energy.**
- **Methods of operation.**
- **Protective coatings, inert atmospheres.**
- **Improved heating, higher forging temperatures.**

RESEARCH will be the key weapon for the forging industry in its fight for survival with foreign competition and other processes, believes Harry B. Goodwin, consultant, Metallurgy Department, Battelle Memorial Institute, Columbus, Ohio.

He says the industry needs increased production efficiency via capital equipment, more technological information on how and why metal flows, and methods for reducing wasted heat.

Mr. Goodwin cites three pressures behind those needs: 1. Vigorous competition from Europeans who have newer equipment and up-to-date methods. 2. A trend toward short runs with expensive materials. 3. A trend toward forging as closely as possible to final dimensions.

• Present knowledge pinpoints needed improvements in equipment. New studies will enable engineers to increase forging efficiency.

Only a portion of the energy generated by steam hammers is utilized in the forming of hot metal. The lost energy that gradually destroys foundations, anvils, dies, and hammer frames is more than wasted, states Mr. Goodwin. It often damages remote structures. If engineers can determine the mechanism of such losses, much progress can be made toward improving efficiency.

It is easy to calculate the moving energy (kinetic) stored in the piston, ram, and upper die of a hammer before impact. By subtracting from that figure the energy of rebound and the energy imparted to the anvil, you may theoretically tell how much work went into shaping the part.

Some engineers do not carry the analysis beyond those simple calculations. Unfortunately, the data tell us nothing of shock wave behavior in the workpiece, anvil, and other hammer parts, states Mr. Goodwin. "We need a more detailed analysis before we can adequately calculate the stresses in various hammer parts, so we can redesign them, make them more efficient, and put more energy into shaping the part."

• The British learned a lot in a recent study of costs and productivity in several forge shops.

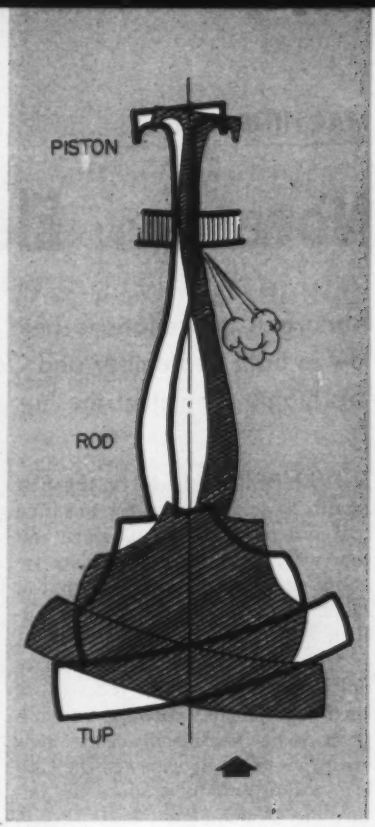
The report stressed the low utilization of equipment by forgers. Reasons given: Inefficient or insuffi-

British Study of Hammer Action Illustrates How Research Can Improve Forge Construction

The British figured the hammer and anvil as damped, multiple spring-weight systems. The anvil has three large parts—anvil, foundation, and ground—which can be thought of as weights connected by a series of springs and dashpots.

During forging, the study showed, the "weights" oscillate in three translational and three rotational ways. In addition, each undergoes oscillating dimensional distortion—a kind of wavelike expansion and contraction.

When the top die strikes a workpiece, the investigators noted, shock waves travel through the several parts of a forging press. They obey known laws of refraction and reflection. The shock waves directly affect the duration of a hammer blow, the British report states. Study of the shock waves should permit more accurate calculation of stresses in the hammer parts and more accurate determination of what happens to the energy.



cient furnacing, inadequate handling equipment, and inadequate programing.

Heating costs are 30 to 80 per cent of forging costs, says the British report. Fuel is the major item of expense. Up to 14 times the theoretical amount of heat needed is often used on ingots.

Recommendations: To get higher forge utilization, manipulating and transporting functions (furnace to forge) must be divorced from each other. The separation must apply to both people and equipment. A manipulator must have fast acceleration, be able to grip ingot ends, and lend itself to automatic position control. If the manipulator is matched to high stroking rates, remote control and programed forging seem necessary.

• Fundamental study of plastic metal flow will be needed by designers who are out to improve equipment efficiency.

Studies of how metal flows have been approached from two points of view: The physical metallurgy involved during plastic flow; mathematical analysis of flow and accompanying flow stresses.

• A number of foreign firms are starting to try completely automated forging setups.

"I see no reason why automated feeds are not entirely practical," says Mr. Goodwin. "A fully automated, 2400 ton mechanical press produces 1200 crawler track links per hour. Formerly, a three man crew on a hand fed press turned out 275 an hour."

In this country, automotive valves have long been forged on automatic setups that utilize practically every stroke of a press. The parts need only minimum machining.

• Value of research is pointed up by progress made so far.

A number of people have found that die friction seems to be greatly reduced by higher die temperatures, says Mr. Goodwin. Of course, the higher the stock temperature, the more easily the metal will flow. Since it is die contact that cools, higher die temperatures mean higher stock temperatures for longer periods.

Government sponsored research at Armour Research Foundation of Illinois Institute of Technology, Chicago, led to castable dies which operate at 1600° F and to workable die heating methods. One result: Drastically improved filling.

The government is considering extension of such research with the idea of developing ceramic or metal-ceramic dies which will operate at 2400° F without protection.

Superimposing a vibration or pulsation on top of the pressure exerted in press forging is said to lower die friction and increase metal flow. Some work is being done by Ladish Co., Cudahy, Wis., and the Russians are said to be investigating the technique.

• The potential of research is great. Mr. Goodwin points out: Shop people, for example, have improved hammer output per manhour 20 to 30 times during the last century via what amounts to trial and error methods.

He thinks that now is the time for more formalized programs. Researchers should be freed from routine problems, so they can take a better look at the whole process.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

November: Eleventh Hour Upturn?

Abnormal cancellations held machine tool industry figures low in both September and October. Now it looks as though this month may start the hoped-for upswing

NOVEMBER ought to be the best month so far this year for machine tool orders. If it doesn't turn out that way, machine tool builders are going to begin to wonder what it takes, short of war, to get an upturn.

The builders poured millions of dollars into wholesale redesign of their equipment, then spent millions more to introduce the new machines. Nobody expected the Chicago exposition to produce an immediate boom, but nearly everybody figured sales (which have been at a walk most of the year) would pick up some speed in the fourth quarter.

- **September was a disappointment. Now it looks as though October was worse. Both figures are deceiving.**

The machine tool industry reported net sales of metal cutting machine tools totaled $42,450,000 in September. It begins to look as if October won't top the $35 million mark.

The picture isn't as bleak as it looks. In September, cancellations ran abnormally high—$6.8 million. With the more normal cancellation level of about $2 million, September would have figured at more than $47 million—a decent volume. The October figure, too, will be distorted by cancellations that could run more than $10 million.

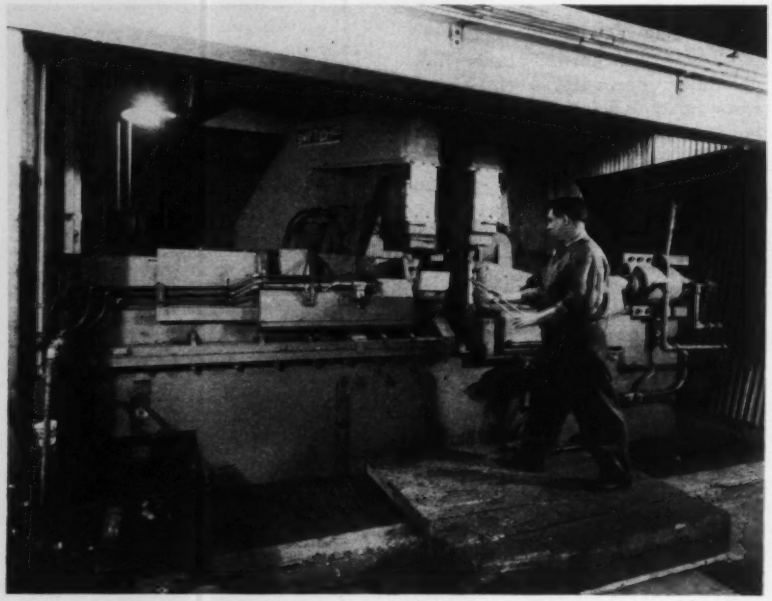
In both months, the cancellation bulge can be credited to special machines for the auto builders. The latest to cancel is Oldsmobile, say several sources. Coming in October, the Olds cancellations are reported to account for a major share of the total industry losses.

Part of the auto industry problem is blamed on porosity in aluminum engine castings (see Page 71). Automakers are said to be reluctant to spend heavily on equipment for large aluminum engines until the metal problem is worked out on the smaller engines.

If business in standard machines continues on its present level, and if no further drastic cancellations come in, November should be a healthier month.

Another optimistic note: Machine tool buyers who went to the exposition told STEEL they intend to buy yet this year. (STEEL, Nov. 7, p. 71.) They have only two months left to do so.

Most of the business show goers place will probably be in the standard machine tool category. Builders of special machines say they have little incoming business to talk about. One said: "We aren't getting any business here—and we're not losing much to competitors." The exception: Some orders are still being received from foreign auto builders (Simca and Fiat were mentioned).



COMPOSITE WELDER combines expensive tool steel alloys and mild steels to make tool dies at the Forging & Casting Div., Allegheny Ludlum Steel Corp., Detroit. Electric buttwelding puts premium material only on the working surfaces of the die; that makes for lower production costs with no sacrifice of performance

Tools for Schools

In 1956, the government put about 100 surplus machine tools a month into the public schools. Today, the rate is about 800 a month. The increase is a direct result of the government's attempt to make good use of the machinery without flooding the machine tool market and without carrying them indefinitely at public expense.

About 260 from the South Charleston Depot (being closed) will go on the school list. Government sources say the school requirements call for 108,000 machines. At present rates, it would take ten years to fill those needs.

"Our manufacturing efficiency, foolproof assembly and better profits started on the drawing board when we designed ***OHIO WELD PARTS*** *into our mowers."*

REPORTS CHIEF ENGINEER WILLARD O. TSCHANTZ OF THE ARIENS COMPANY

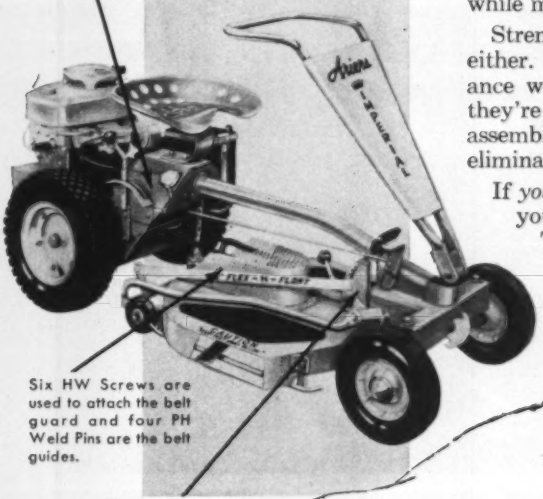
Forty-four weld parts were designed into the new Ariens Imperial lawn mower, and every one of them contributes to faster, easier, more economical production.

These parts . . . nuts, screws and pins . . . are resistance welded to components in early manufacturing stages. The welding is instantaneous . . . and permanent . . . subsequent assembly quick and simple. There's no fumbling to join parts, no "blind" fishing to hold fasteners in place while mating parts are screwed on.

Strength is not sacrificed to gain these manufacturing advantages either. Products joined with weld fasteners are much stronger. Resistance welding makes them *integral* parts of the components to which they're welded. Maintenance and repair are simplified, too, because disassembly and re-assembly are easier. The risk of losing fasteners is eliminated.

If *your* product is metal and you have resistance welding equipment, you owe it to your profits to know more about Ohio weld parts. Take 10 seconds to write for our catalog. Those 10 seconds could be the most profitable you spend today.

Fourteen RN Nuts and six HW Weld Screws are used to mount the motor, seat brackets, shifting bracket and control brackets on the frame.



Six HW Screws are used to attach the belt guard and four PH Weld Pins are the belt guides.

The height adjustment quadrant and the bearing flanges are mounted on HW Weld Screws. Ohio weld parts are also used on the brake bands, mower lift link and the belt fingers.

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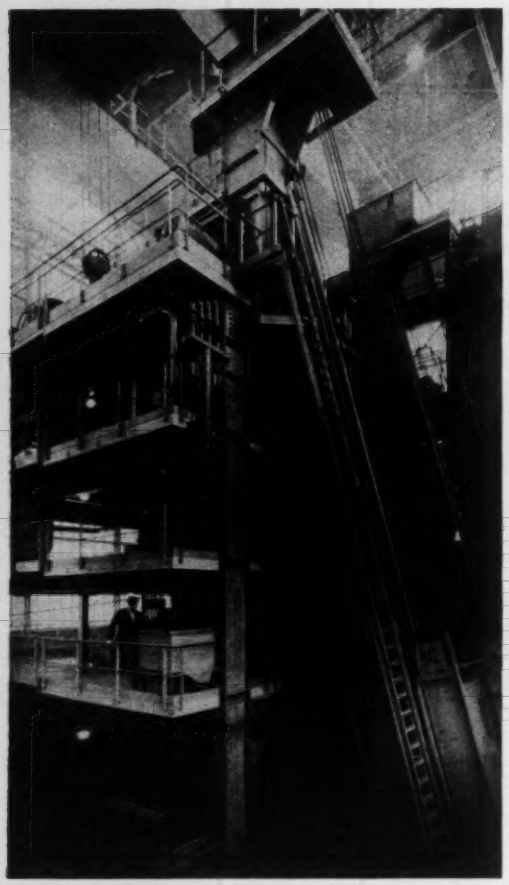

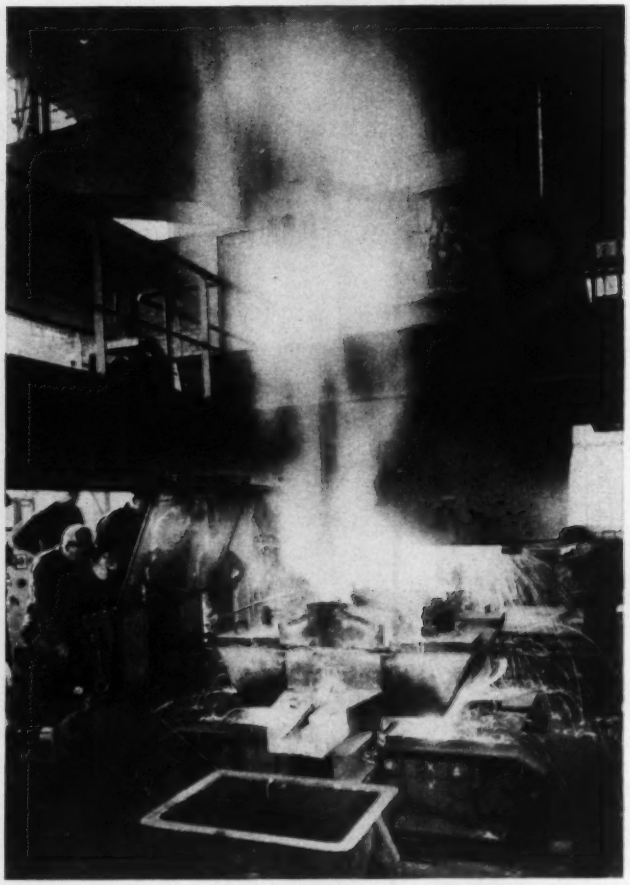

Ladles of steel are carried to the top of the casting tower by an inclined hoist (left) at the French facility, then poured through a tundish (right) and into the molds

Continuous Casting Gains Abroad

Performance is said to be as predictable as that of a rolling mill or other steel plant equipment. Startup of French and Italian facilities was routine

U. S. STEEL producers with modest melting capacity — or larger plants making more steel than they can process conveniently in existing mills—may get help from continuous casting.

The casting equipment is said to operate most economically in plants where annual melting capacity is 200,000 tons or less. But the process isn't limited to small section strands. Slabs as large as 5 by 40 in. have been cast in the Kapfenberg (Austria) plant of Gebr. Bohler A. G. And still larger sections may be produced continuously in the near future.

The process continues to gain popularity abroad, especially in Europe. Two of the latest installations are at Societe des Aciers Fins de l'Est (S.A.F.E.), Hagondange, France (near Metz), and at Terni Societa per l'Industria e l'Elettricita, Terni, Italy.

Built by Demag A. G., Duisburg, Germany, both plants use the Siegfried Junghans casting process, which was developed commercially by two other German firms, Mannesmann-Huttenwerke A. G., Duisburg, and Gebr. Bohler & Co. A. G., Dusseldorf.

• **The French casting plant produces four strands, but its capacity**

METALGRAMS

UNION CARBIDE METALS

. . . news about "Electromet" ferroalloys and metals

NOVEMBER, 1960

AN EFFICIENT BLOCK -- Why is silicomanganese the most popular blocking alloy in the steel industry today? It dissolves 50 per cent faster than separate silicon and manganese additions, giving faster blocks and shorter blocking times. Its low-carbon content allows higher tapping carbons, reducing furnace time and also aiding steel cleanliness. Since silicomanganese is a more powerful deoxidizer than straight silicon blocks, it gives tighter blocks that last longer. Finally, silicomanganese provides low-cost silicon and manganese, reducing blocking costs to a minimum.

* * *

BETTER CONTROL, TOO! -- Results of hundreds of open-hearth production heats show that a silicomanganese block gives better control of carbon content and alloy additions. Off-grade heats for carbon and manganese have been shown to be lowest for silicomanganese compared to a pig ferrosilicon or a 50 per cent ferrosilicon block. Also, silicomanganese gave a higher manganese recovery than other blocks when all the manganese was added to the furnace. For details, write for the article, "Silicomanganese Improves Blocking Performance," in the Fall 1960 issue of UNION CARBIDE METALS REVIEW.

* * *

LOWER COSTS FOR STAINLESS STEEL -- Another manganese-silicon alloy -- ferromanganese-silicon -- is saving stainless steel producers thousands of dollars per year. Used for slag reduction and manganese additions, ferromanganese-silicon is replacing other low-carbon manganese sources. Savings per ton: $0.75 to $1.75 for type 300 stainless grades and $4 to $9 for type 200 grades. Some stainless producers have also found that ferromanganese-silicon produces cleaner steels. Write for F-20,093 for further information.

* * *

BUILDING BIGGER MARKETS -- "Your man's practically a member of my staff," a president of a steel firm said of one of UCM's market development specialists. These men work with steel producers to develop new markets and expand old ones. Primarily, they promote the use of stainless steel and titanium (including castings) in transportation, architecture, process industries, and consumer goods. More details can be obtained by writing for the article, "Men, Metals, and Markets," in the Spring 1960 issue of UNION CARBIDE METALS REVIEW.

* * *

PRODUCTS WITH A SPLIT PERSONALITY -- Several "Electromet" alloys and metals are used in both metals and chemicals. Silicon metal -- an important alloy in aluminum and copper -- is a key raw material for silicones. Vanadium oxide -- used in tool and constructional steels -- is a catalyst in the production of adipic acid, sulfuric acid, maleic anhydride, and phthalic anhydride. It also gives special colors to glass and ceramics. Finally, "Elmang" electrolytic manganese -- high-purity manganese for stainless steel, deep-drawing steels, copper and aluminum -- is a catalyst for adipic, terephthalic, and acetic acids. Write for the article, "Products with a Split Personality," in the Spring issue of UNION CARBIDE METALS REVIEW.

* * *

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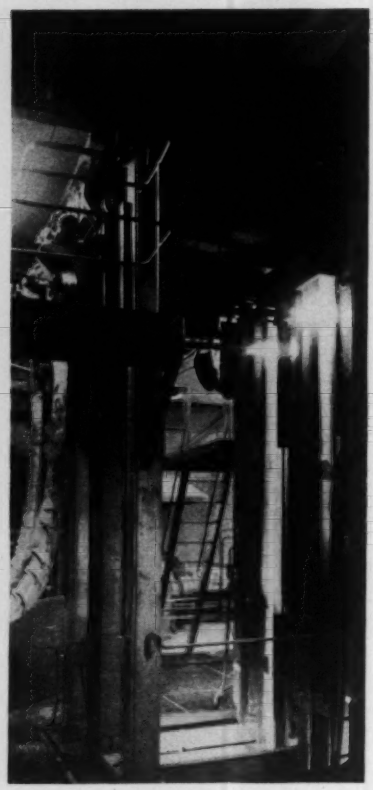
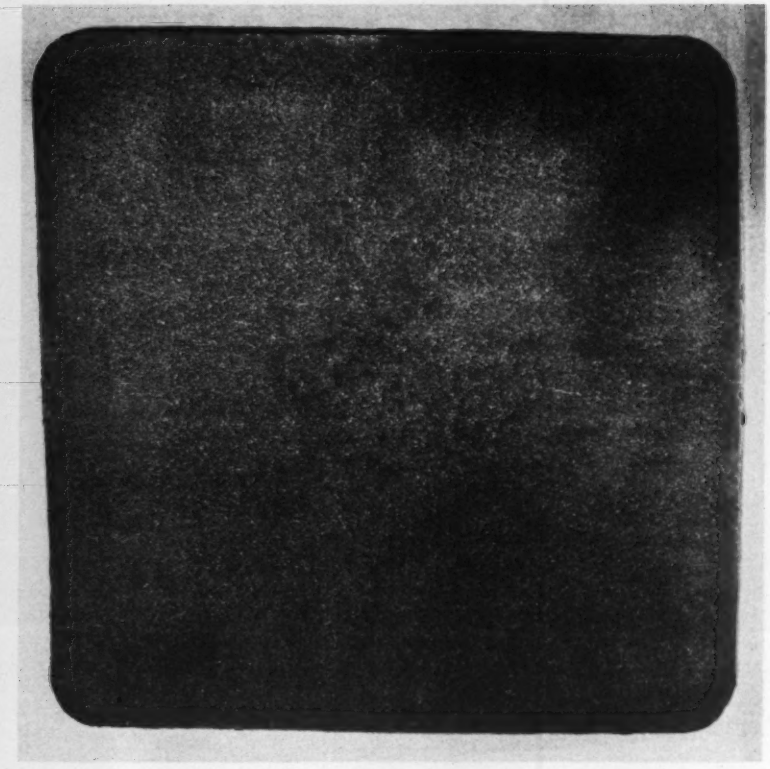




Flame cutting machine (left) in the French plant moves downward with the strand, insuring a square cutoff. Cross section (right) shows sound billet structure

will be doubled when more molten steel is available.

Molten metal in 35 ton ladles is taken to the top of the 80 ft casting tower by an inclined hoist and poured into a tundish that serves four square molds.

Strands about 3½, 4½, and 8 in. square emerge from the molds at infinitely variable speeds—about 2 to 20 in. per minute. At the bottom of the tower, flame equipment cuts the strands into billets 110 to 158 in. long.

The four strand output represents only half the plant's potential, says a Demag official. When the company installs another 50 ton, electric arc, steel melting furnace, casting facilities will be modified to handle the larger supply of steel, and eight strands will be produced.

• The Italian installation casts eight strands at a time. It is served by a conventional ladle crane.

Facilities designed to cast up to 200,000 tons of steel annually were put into operation at Terni in late 1958. Eight strands, about 4⅓ or 5½ in. square, are cast from 60 ton, open hearth heats. Smaller heats from an electric melting furnace are cast from a 30 ton ladle, producing four strands.

Steel comes out of the tower at speeds up to 9 in. per minute. It is cut into billets about 118 in. long.

• The process is said to be extremely predictable. Molten steel cools as it passes through bottomless molds, forming continuous strands.

"Continuous casting is operational," says George A. Zaharoff, general manager, American Demag Corp., Pittsburgh. "Successful operation of such a casting installation is as predictable as that of a rolling mill or other piece of standard steel plant equipment."

The teeming ladle is lifted to a position above the tundish and molds, with a crane or inclined hoist. Prior to casting, the tundish is heated to keep it from cooling the molten steel.

Metal from the ladle flows through the tundish and into water cooled, bottomless molds (plugs are inserted in the molds to form temporary bottoms at the beginning of the cast). The molds are oscillated to keep the strand moving steadily downward.

Solidification continues in cooling chambers, where the strands are supported and guided by hydraulically actuated rollers. A flame cutting machine at the bottom of the casting tower divides the strand into billets which are placed on a conveyor by a tilting device, then taken to storage or finishing areas.

Have you entered the

Usership Contest?

See the Servicenter, Pages 5 and 6.

With A-L's Tool Steel Steelector System

You Check Warehouse Availability Right At Your Own Desk

How often have you wished that you could bring the tool steel warehouse right to your desk so that you could see what grades and sizes and shapes are available immediately?

The new Allegheny Ludlum STEELECTOR Program does virtually just that. Special Data Stock Lists (18 of them) for each STEELECTOR Grade specify the complete necessary range of sizes and shapes available that will suit virtually all applications. They also list the working hardness of typical applications, temperatures for hardening, tempering, and annealing, plus other data.

You can count on the availability of STEELECTOR Grades. Mill depot and warehouse stocks have been selected and arranged to take the pressure off your own inventory. With the STEELECTOR Program you can select tool steels almost at a glance and be sure that the steel you have picked is in stock—ready for delivery—before you place your order.

Three STEELECTOR Cards make it easy to choose the proper steel for your application. The cards cover tool room, hot work, and high speed grades. The properties of the STEELECTOR Grades are shown by bar graphs for abrasion resistance, toughness, size stability, machinability, and red hardness. You can pick the grade with the particular combination of properties you need just by glancing at the graphs.

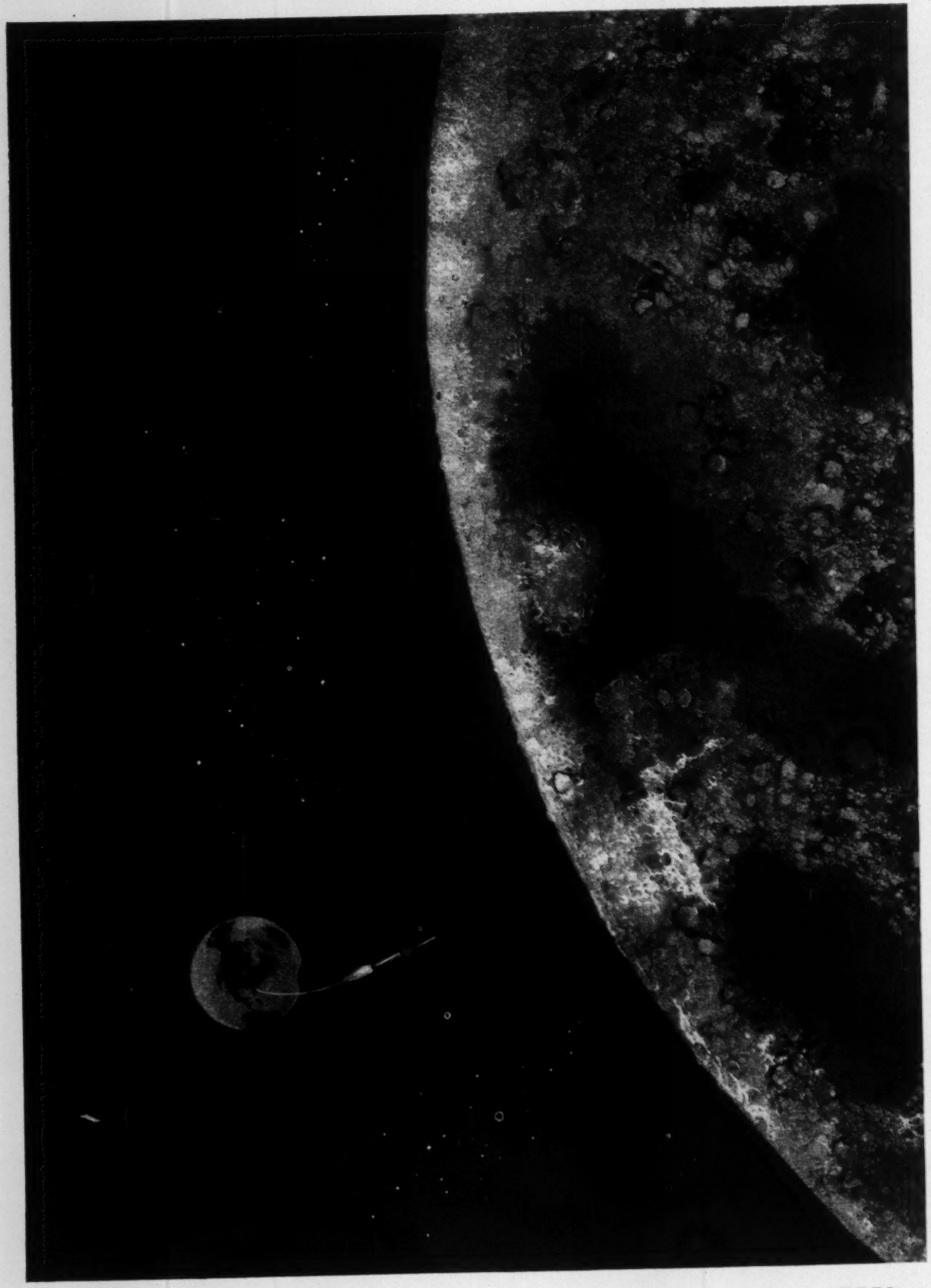
The colorful Tool Steel STEELECTOR Booklet gives complete details of the program, explains the Data Stock Lists, and includes the three STEELECTOR Cards. Ask your Allegheny Ludlum sales representative for your copy, or write: *Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pennsylvania. Address Dept. S-11.*

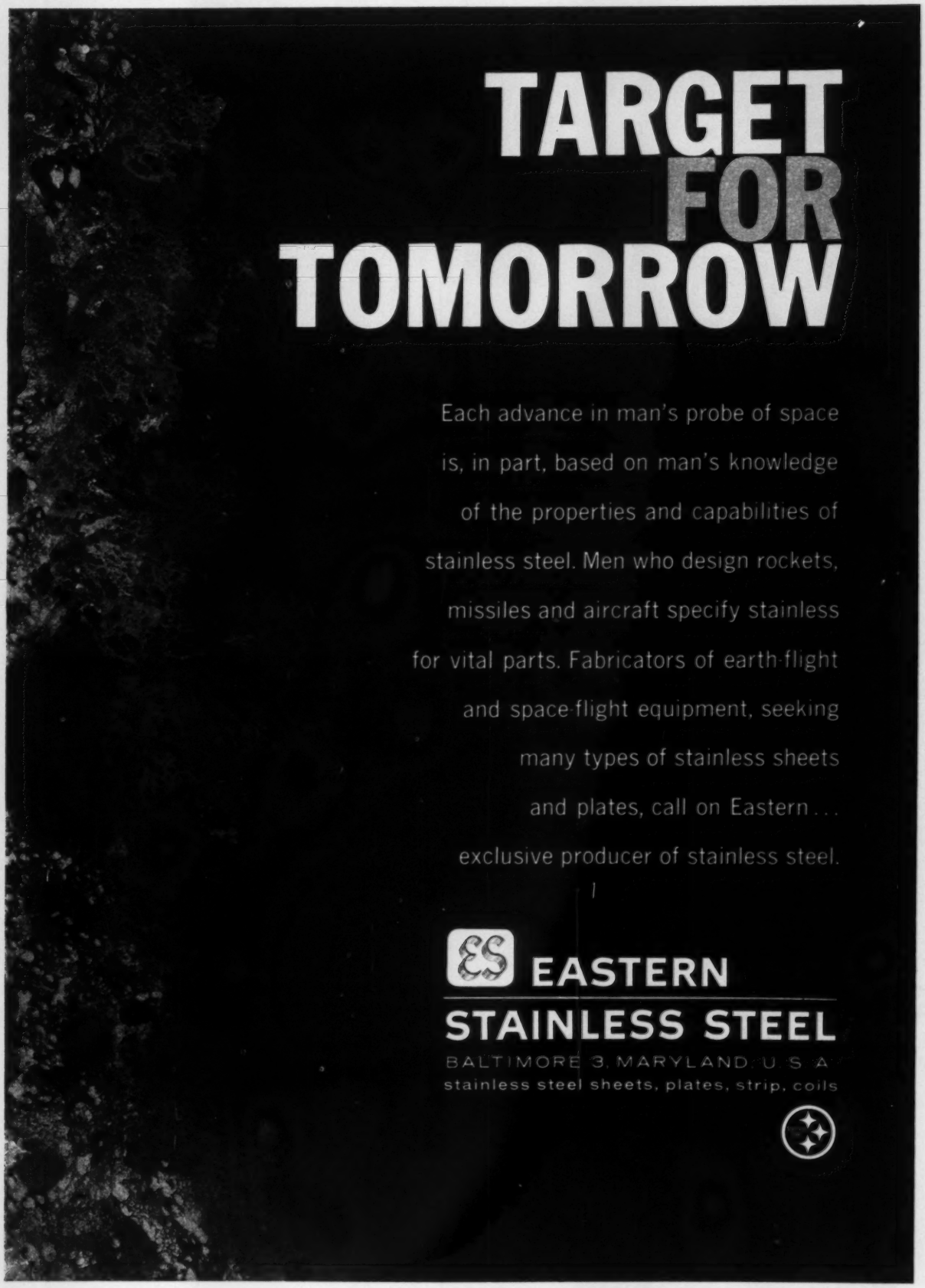
STEELECTOR PROGRAM

ALLEGHENY LUDLUM

Tool Steel warehouse stocks throughout the country

1995

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Each advance in man's probe of space is, in part, based on man's knowledge of the properties and capabilities of stainless steel. Men who design rockets, missiles and aircraft specify stainless for vital parts. Fabricators of earth-flight and space-flight equipment, seeking many types of stainless sheets and plates, call on Eastern . . . exclusive producer of stainless steel.
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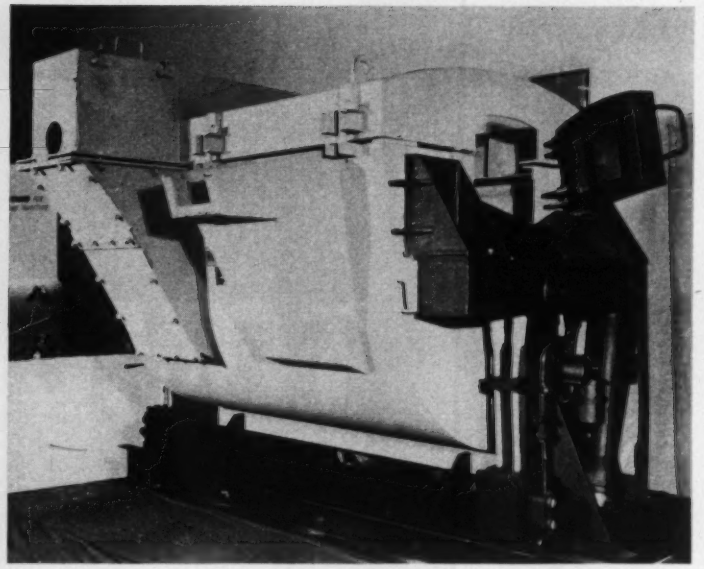

Apertures that permit ease of cleaning are demonstrated by Franco Manzoni (left) of Tagliaferri to E. E. Staples of Hevi-Duty. Furnace (right) exhibited at Metal Show has been shipped to user

New Induction Furnaces Offer Composition Control

Other advantages cited: Readily variable pouring temperatures, simplicity in changing from one analysis to another. U. S. firm will manufacture the Italian designed units

A NEW furnace line offers foundrymen easier control of composition, readily variable pouring temperatures, and simplicity in changing from one analysis to another, claims Hevi-Duty Electric Co., Milwaukee, a division of Basic Products Corp.

The 60 cycle, induction equipment will be built at Hevi-Duty's Watertown, Wis., plant under a license with Forni Elettrici A. Tagliaferri, S.p.A., Milan, Italy.

One of the furnaces, a receiver and mixer designed for the production of high quality cast iron, was exhibited at the Metal Show. Taking advantage of the electromagnetic stirring action caused by induction, the unit permits changes in composition to be made while iron is being held for pouring. The company feels that the arrangement will permit greater flexibility in foundries and simplify cupola charging by tolerating wider variations in iron tapped from the stack.

• Corrections can be made with negligible losses, it is said.

Adjustments made in the cupola (particularly for carbon and silicon) involve corrections for losses and a delay between the time the correction is made and the time that molten metal of the revised composition reaches the spout. The heat input in what amounts to an electrically heated forehearth allows scrap to be added to reduce carbon content; graphite or alloys may be added to increase the appropriate constituent without substantial losses.

Modifications in the as-tapped iron to maintain constant composition for pouring can aid the foundryman in producing more uniform castings.

• Heat input to the furnace can be controlled.

Varying the power input to the furnace will permit superheating of the metal. Metal temperature can be closely controlled, and long holding times are practical if a delay occurs in pouring. Metal remaining in a pouring ladle can be returned to the induction furnace; it need not be pigged off and remelted to prevent skulling in the ladle. The power input to the metal permits it

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to be reheated to proper pouring temperature. The power factor can be corrected with capacitors to provide added economy in operation.

The furnace exhibited at the Metal Show has a capacity of 4 tons. Units up to 50 tons will be available.

• **Several designs are being offered.** "We believe our new, low frequency induction melters and receivers will meet a need in this country and Canada for melting equipment that will consistently supply high quality metal at low production cost," says E. E. Staples, Hevi-Duty president. He notes that the units have been installed in "hundreds of foundries throughout Europe, Asia, and South America."

The low frequency units are available with and without channels and offer the possibility of charging materials such as borings and turnings. All units are the tilting type for ease of pouring. The electrical portion of the furnace and the tilting mechanism are not an integral part of the furnace chamber. So it is possible to have a second refractory lined unit ready, to put in position, allowing a used chamber to be removed for relining.

Since the furnaces can be almost completely drained and still deliver full power, there is no need to contaminate one charge with another.

Hydraulic tilting mechanism is standard. Tate Elliott, application engineer, and Mr. Staples watch Manzoni demonstrate

Melter calculates scrap, hot metal, and lime requirements for a heat of steel

Computer Tightens Control Of L-D Steelmaking Process

AN ELECTRONIC computer that writes formulas for basic oxygen steelmaking has been installed at the Aliquippa (Pa.) Works of Jones & Laughlin Steel Corp.

The analog computer, supplied by Electronic Associates Inc., Long Branch, N. J., determines the proportions of hot metal, scrap, and lime that must be charged into the furnace to tap a particular type of steel at a specified temperature.

• **Tapping or finishing temperature is said to have an important effect on product quality in L-D steelmaking.**

One of the critical phases of steelmaking is the finishing of a heat within a selected temperature range, such as 2880 to 2920° F. The amount of cold scrap used in the initial charge is said to be an important factor in controlling that temperature.

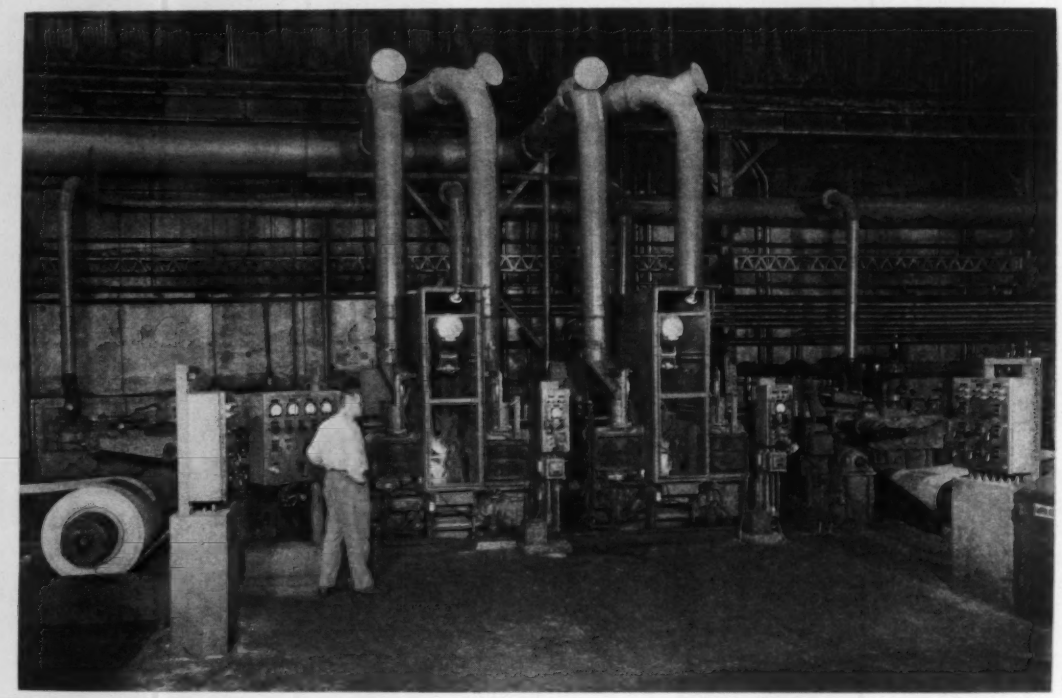
Mathematical equations developed by W. J. Slatosky, research physicist, and other personnel at the Graham Laboratory for J&L Research, Pittsburgh, permit advance calculation of the scrap, fluxing materials, and hot metal needed to insure a particular tapping temperature. Those equations, developed on the company's analog computer, were tested with a slide rule type computer designed around the mathematical model of the process. Then the company decided that an electronic computer would be more useful to operating personnel, because it was more accurate, and easier to operate.

• **Computer inputs, representing process variables, are applied by potentiometer settings; charge weights required are displayed in succession.**

To compute the charge for a heat of steel in the Basic Oxygen Furnace Dept., the melter sets the computer potentiometers to indicate the required charge weight, tap temperature, basicity ratio, lance height, and weights of scale and ore additions. He also sets potentiometers to indicate hot metal, ferrosilicon, and ferromanganese temperatures, then presses a button, causing the computer to record all inputs.

The melter waits about 5 seconds for the computer to print the data.

He then presses a button to advance the device to the "compute" position, during which control equations are solved for given input conditions. Computed quantities of scrap, hot metal, and lime can then be read by the operator.



Belts on these vertical Acme grinders can be changed in 45 seconds. Strip is run through several times

Automatic Grinder Line Upgrades Stainless Strip

Low grade coils were formerly given a light cold reduction, shot blast treatment, and a cold rerolling. Sometimes, deep slivers could not be removed. Scrap was generated

AUTOMATIC strip grinding helps Republic Steel Corp.'s plant at Massillon, Ohio, upgrade unsatisfactory coils of stainless steel by removing slivers, scratches, mechanical marks, and patterns.

A typical, 38 in. coil of stainless weighs nearly 6 tons and costs about $5750, say Republic officials. Upgrading unsatisfactory material can bring considerable savings.

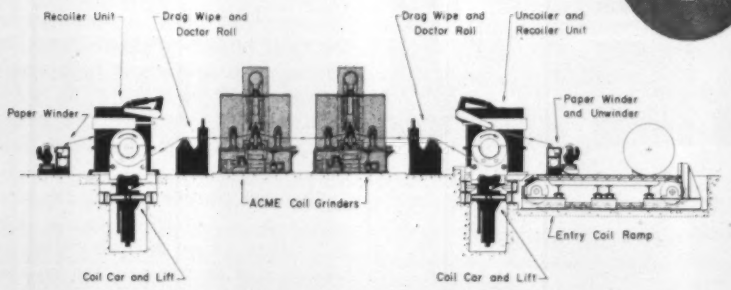
The grinding line has four features:

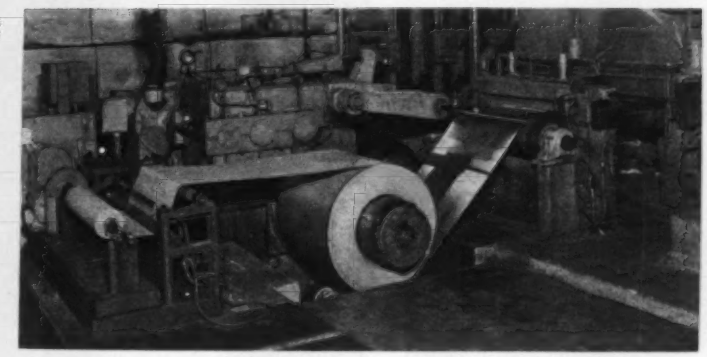
- Tip to tip grinding and polishing of coiled stock.
- Selective spot grinding of localized areas.
- Variable line speeds to control stock removal.
- A backup (billy) roll that permits handling stock 0.018 to 0.187 in. thick.
- Unsatisfactory coils are bypassed through the rolling line at an intermediate production stage.

Normally, coils are hot rolled, annealed, pickled, and cold rolled. Many have surface defects which cut coil yield and impair quality.

Low grade coils were formerly given a light cold reduction, shot blast treatment, and a cold rerolling. The method often failed to remove deep slivers. In such cases, the coils were either cut into sheets and ground on a single purpose machine, or slit and the defective portion removed and scrapped.

Coils that need grinding are removed at the intermediate band stage and placed on a coiler and recoiler at one end of the line. The strip passes through a drag wipe, doctor roll, and two coil grinding units to a recoiler at the opposite end. The coil passes back and forth through the grinders as many times as are needed to remove the defects.





Grinding line can handle 52 in. strip up to 0.187 in. thick at 60 fpm. Payoff reel has provisions for automatic paper winding

• The coil grinders use abrasive belts. Adjustable backup (billy) rolls and variable line speeds control the amount of metal removed.

About 2 per cent of the strip weight is generally removed. Grinding is done dry. The first three passes are made with a 60 grit belt; three additional passes are made with 80, 100, and 120 grit belts. When one side of the coil is finished, it is turned and ground on the other side.

A pneumatic tension arrangement permits quick changes from one belt to another. Each grinder is powered by a 150 hp motor. The backup (billy) roll pressure is maintained hydraulically.

• Special features permit grinding the entire coil length, including ends.

Without the special provisions in the grinder, up to 20 ft of the coils at each end could not be ground or polished—a loss caused by feeding the coil ends into the rewind reel before grinding begins. Here is how the system avoids such losses:

Sets of four pinch rolls are ahead of and behind the belt on each grinder. The upper two are idlers; the lower ones are driven by a 10 hp motor which keeps them synchronized with the payoff reels. Air cylinders raise or lower the power driven roll to provide an auxiliary coil drive when needed.

To start grinding, the coil end is passed through the drag wipe and doctor roll, threaded into the pinch roll and inched through. When the stock passes into the second set of pinch rolls, the operator raises the backup roll and grinding starts. Operators then switch from inching to automatic control.

Once ground, coils are returned to the production line for annealing, pickling, and cold rolling to the next gage.

Chrome Plating Processes Evaluated for Market

Marketing of Duramir chromium plating processes will be handled by Diamond Alkali Co., Cleveland. General Development Corp., Miami, Fla., which owns the processes, has applied for patents, says F. E. Mackle Jr., GDC president.

The Cleveland firm will launch a program that will include training for Diamond Alkali personnel and preparation of technical data and manuals, says A. B. Tillman, general manager of Diamond Alkali's Soda Products-Chrome Div. Next step: Field trials to evaluate commercial potential in possible sales areas.

"It is too early to predict sales or earnings from commercialization of the processes," says Mr. Mackle, "but we are highly optimistic about the market potential."

Since the processes were discovered in 1953, they have been under development at GDC and, more recently, at Battelle Memorial Institute, Columbus, Ohio. Tests conducted by Diamond Alkali are said to verify their economy, versatility, and reliability. Pilot plant tests indicated good corrosion resistance and adhesive qualities for parts plated by the processes. They are expected to gain acceptance in several fields, including the automotive industry.

Advantages claimed: Plating of aluminum or its alloys with chromium by simplified techniques; plating of a wide variety of base metals with chromium over a bright nickel plate; and the application of a corrosion resistant, crackfree, chromium plate on aluminum or other base metals ordinarily plated with chromium.

Overlay Fights Corrosion

Spraying a nickel-chromium overcoat on mild steel provided the needed corrosion resistance for an outboard motor shaft and permitted the manufacturer to cut his costs 52 per cent compared with material and machining formerly employed.

The mild steel rod can be machined easily. Only the exposed 6 in. of the shaft is sprayed. Build-up is about 0.001 to 0.0015 in. Fusion takes place in a controlled atmosphere furnace.

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The cost of ALLEN Hex-Socket Cap Screws is only a minor fraction of your assembly costs . . . be sure you're getting the timesaving, cost-saving advantages of genuine Allens!

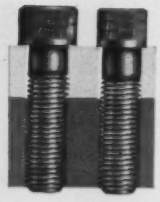
Ever since Allen first produced the hex socket head screw nearly fifty years ago, specifying *genuine* Allens (made by Allen of Hartford) has been a sure way to guarantee dependable threaded fastening.

Only *genuine* Allens have Leader Points that make starting easier, and greatly minimize danger of cross threading. *Genuine* Allens are "pressur-formd" to preserve the long fibers uncut throughout the length of the screw, giving stronger sockets for greater tightening torque.

Write for samples and engineering data. See how *genuine* Allens will make your product better.

ALLEN HEX-SOCKET SCREWS HEAD

Allen's new 1960 Series Socket Head Cap Screws give up to 2⅓ times more load carrying capacity, without indentation. Head diameter of sizes from ¼" up is now uniformly 1½ times the body diameter—providing more under-the-head bearing surface, and a proportionate increase in clamping force. Write for new Bulletin G-25, with full specifications.



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Composition Control Rated High in Zinc Diecasting

Control of alloy composition is the most important single factor in obtaining long life and high quality in zinc diecastings, states John L. Kimberley, executive vice president, American Zinc Institute, New York.

"Neither control of dies, die temperatures, die release agents, nor any other phase of processing or tooling can compensate for an improper alloy," he emphasizes.

While zinc diecasting failures attributable to improper alloys have dropped in recent years, producers can obtain still more benefits from control systems which maintain proper control of alloying elements, he believes.

Lubricant Aids Hot Forming

Coating metal surfaces with a new lubricant called Phosphatherm prevents galling, scoring, and metal pickup at temperatures of 1100 to 2200° F, says Alpha - Molykote Corp., Stamford, Conn.

The material contains a mixture of phosphates and other salts which melt at a lower temperature than any of the components separately. When spread on a hot surface, it melts to form an adherent, spreading film which has excellent lubrication properties. It works equally well on forming tools and production pieces, especially those made of alloys, claims the firm.

For application purposes, the material may be dissolved in water or applied dry to surfaces over 400° F.

Tip on Getting Time Data

A slight error in a stop watch or timer selected to obtain standard time data on which to base a cost estimate for assembly or production can be expensive, warn timing analysts at Heuer Timing Corp.

They suggest following this basic rule to determine the correct timer for precise data recording: First, select a dial execution with the largest divisions obtainable for an individual timed operation. Then, select a movement that will indicate a total elapsed time approximating the maximum duration of the operation.

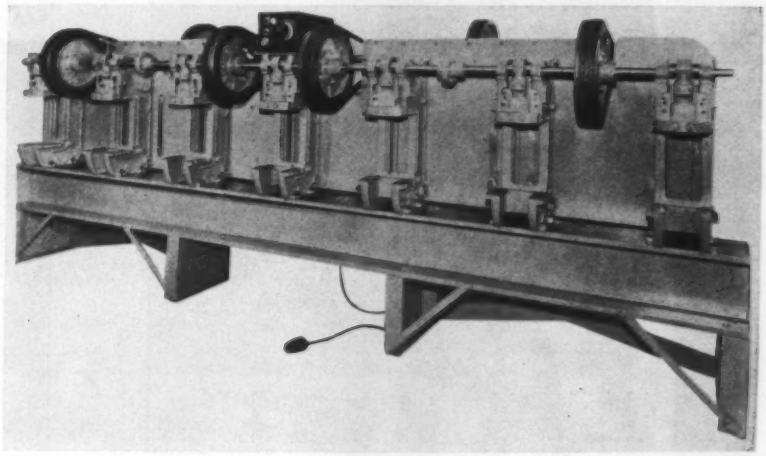
Unit Has Seven Punch Presses for Long Material

SEVEN, 8 ton punch presses on the Kenco Mark VII-8E can evenly distribute 56 tons throughout a length of 16 ft.

The unit is designed to cut handling costs when various press applications are required in long material.

Features: No stored kinetic energy in the flywheel and no clutch mechanism. For safety, the operator must fully depress two palm buttons. If one hand is released during the cycle, the unit stops and all power is instantly shut off.

For further information, *write* Kenco Mfg. Co., 5211 Telegraph Rd., Los Angeles 22, Calif.



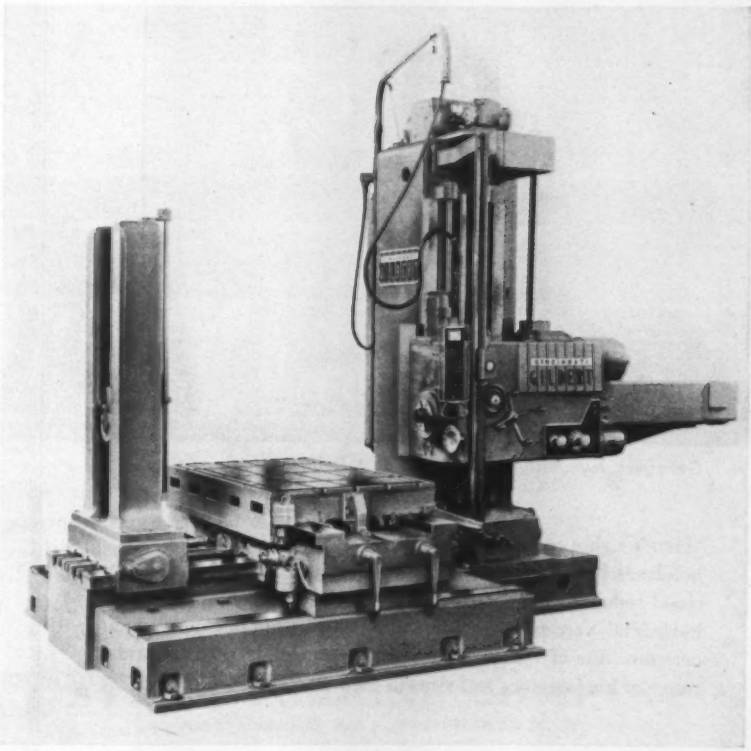
You Can Put Tape Controls on This Boring Mill

DESIGNED to take advantage of the developments in numerical positioning control and numerical contouring, this boring mill is suited for tracer controls. Building block units permit many combinations of table, saddle, bed, and column sizes.

In addition to tape controls, the machine may be supplied with the basic vernier measuring system, optical measuring, precision rod and dial indicator measuring, or precision automatic positioning of the head, table, and saddle. The automatic positioning device (accurate to 0.0001 in.) may be used with precision rods or prebored job rods.

The basic model has a combination, selective pendant and hand shift control. The Di-Matric model comes with complete pendant control. Feeds and speeds are automatically shifted (hydraulically) by rotary selector valves mounted on the head. An optional arrangement permits feeds and speeds to be preselected and automatically shifted from the pendant control.

(*Please turn to Page* 122)



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A. T. Gallagher, Manufacturing Superintendent, Delroyd Worm Gearing.

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*1⅛" center distance, fractional horsepowers — to 12" center distance, 152 horsepower. Reducers to 36" center distance with horsepower capacities to 700 are supplied as standard. Larger units to meet any requirement can be supplied on special orders.

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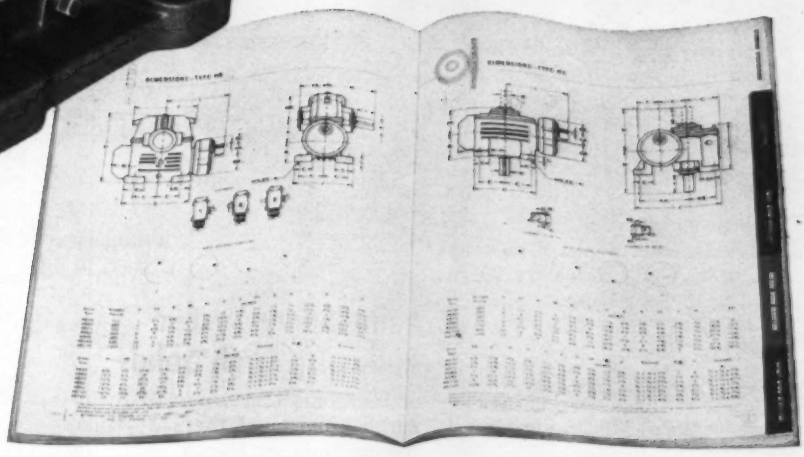


Now available — the worm gear industry's newest, most complete catalog. Contains all basic design and application data, selection charts, ratings and service factors — plus illustrations in full color. For your free copy, write on your company letterhead to: Delroyd Worm Gearing, De Laval Steam Turbine Company, Trenton, New Jersey.

DE LAVAL STEAM TURBINE COMPANY
860 NOTTINGHAM WAY, TRENTON 2, N. J.

DL-210

(*Concluded from Page* 119)

The standard machine has 27 spindle speeds, 12 spindle feeds, and 24 feeds to the saddle, head, and table. You can get an optional setup with 12 additional, extremely fine feeds to the spindle for finishing metals such as stainless steel.

Columns are offered with 36, 48, 60, and 72 in. vertical spindle head travel. Tables are available in 38, 48, and 60 in. widths. Lengths go up to 132 in. The beds can be ordered in a basic 36 in. width and in widths of 60, 84, and 120 in.

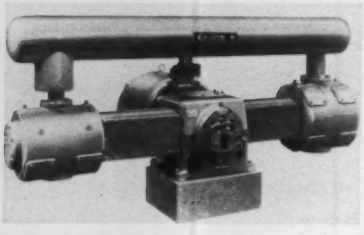
For further information, *write* Cincinnati Gilbert Machine Tool Co., 3366 Beekman St., Cincinnati 23, Ohio.

Packing Keeps Oil Out of Air Stream in Compressor

PISTON rings and piston rods in an air compressor for continuous, heavy duty service are packed with self-lubricating Teflon. The compressor is designed for applications where oil contamination of the air stream cannot be tolerated. It's a balanced, opposed type driven by a flange mounted, electric motor.

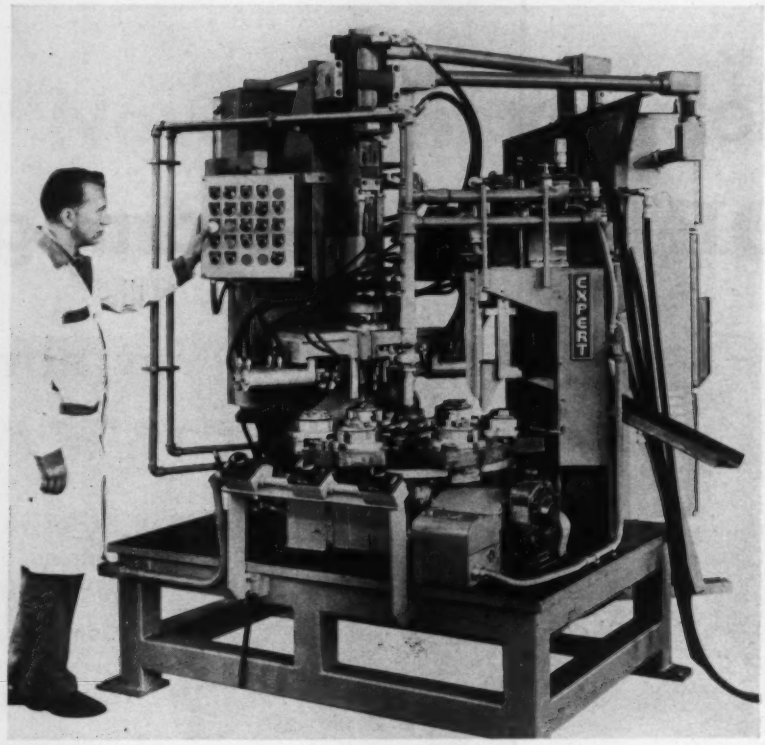
The nonlube cylinder is connected to the crankcase by a piece which is internally divided into two compartments by a baffle plate housing the oil scraper, piston rod packing. The arrangement isolates the compressor cylinder from the main compressor lubrication system.

To further prevent oil contamination, an oil slinger is placed on the rod between the oil scraper packing and the pressure packing.



The compressors are furnished as packaged units with motor and intercooler in position and ready to operate. The company says the units are almost vibrationless and only require foundations large enough to support the weight of the compressor.

For further information, *write* Clark Bros. Co., one of the Dresser Industries, Olean, N. Y.



PROJECTION WELDING OF HORN MOTOR ASSEMBLIES at a rate of about 1000 an hour can be accomplished on this six station, rotary index machine. A high speed index drive helps maintain the production rate. An automatic, air operated hold-down fixture maintains proper part relationship during welding. The machine is electrically sequenced and air operated. Power for the cam drive is supplied by a ¾ hp electric motor. For further information, **write** Expert Welding Machine Co., 17144 Mt. Elliott Ave., Detroit 12, Mich.

Paint Spray System Builds Up High Solids

A HEATED and vaporized hydrocarbon compound that's 2½ times heavier than air is employed in the Chemtronic paint spray process to atomize and apply the paint. It can be used to build up coatings with high solids.

Among advantages cited: Less sags, orange peel, and fewer spray passes; reduced overspray and bounceback due to low atomizing pressures; more uniform coverage in recessed areas; and material savings up to 50 per cent.

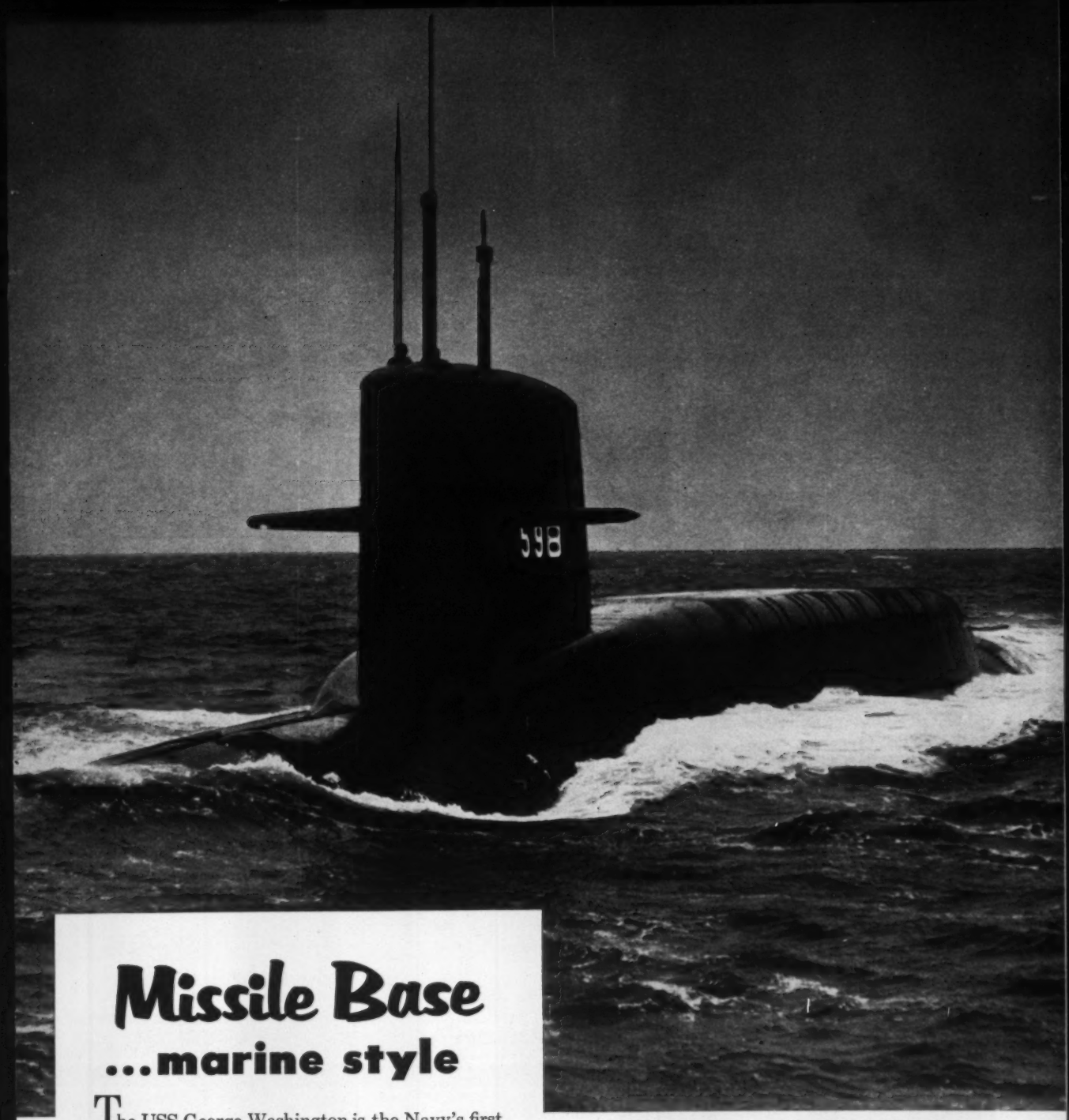
The process can be used with most coating materials. The atomizing agent doesn't mix with the spray. A wide range of fluid nozzles, air caps, and needles is available. Pressure feed, suction feed, gravity flow, and automatic spray guns can be ordered.

For further information, *write* John J. Fannon Products Co., a subsidiary of Hupp Corp., 3000 E. Woodbridge, Detroit 7, Mich.

Coating Protects 3 Ways

A LONG TERM coating known as CRC Soft-Seal is said to prevent the corrosion of metals while they are being processed, stored, and shipped.

The material penetrates grain boundaries, cracks, and pores to form a continuous protective film 1 to 8 microns thick. It can be



Missile Base
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The USS George Washington is the Navy's first submarine equipped to fire the Polaris missile from submerged positions.

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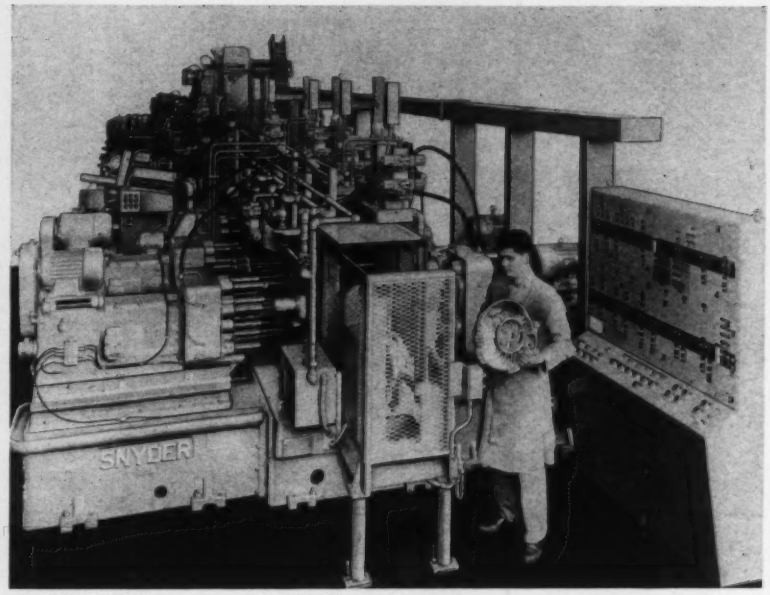
applied by spray or immersion.

The coating is said to be equally effective on iron, steel, aluminum, magnesium, plated finishes, and many other types of surfaces. Length of protection varies with exposure conditions. The coating doesn't become dry, hard, or brittle. The company says it's harmless to painted surfaces and is easily removed with live steam or solvents.

If moisture is present on metal surfaces, treatment with CRC 3-36 eliminates any danger of moisture being trapped next to the surface and cause corrosion, says the company. The coating may be reapplied at intervals to maintain protection.

For further information, *write* Corrosion Reaction Consultants, 116 Chestnut St., Philadelphia 6, Pa.

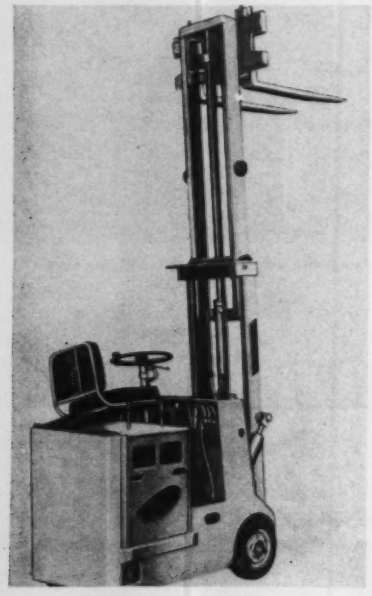


TWO DIFFERENT PARTS ARE PROCESSED AT RANDOM on this special transfer machine. It's set up for machining, gaging, and assembly operations on aluminum cover cases. The building block type unit can produce two parts at a rate of 150 pieces an hour at 100 per cent efficiency. The machine has 56 stations and is 114 ft long. For further information, **write** Snyder Corp., 3400 E. Lafayette, Detroit 7, Mich.

Narrow Aisles Negotiated Easily by This Lift Truck

A SHORT turning radius for maneuverability in narrow aisles permits the F-26-TA-2 electric lift truck to be used for fast tiering of unit loads in crowded warehouses.

The truck has automotive type controls. The inner uprights and elevator carriage are roller mounted to reduce wear and power loss. Capacity is 2000 lb with a 48 in. load. (A 3000 lb capacity unit is available.)



Other features include a worm drive, twin tilt cylinders, hydraulic wheel brakes, safety controls, caster trail axle, and a center sill frame.

For further information, *write* Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, Ohio.

Table Converts Presses To Milling Machines

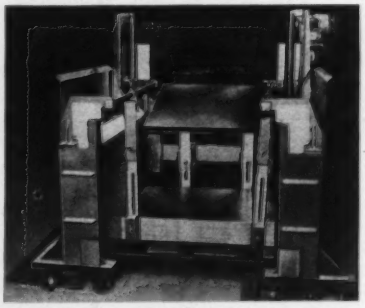
THE Palmgren No. 500 table transforms popular sizes of bench or floor model drill presses into efficient milling machines.

The unit has two cross slide movements, a 360 degree rotary feed, and a graduated tilting adjustment.

The top surface has two, $\frac{5}{8}$ x $1\frac{1}{8}$ in. T-slots which cross at the center. Transverse and longitudinal travel is $4\frac{1}{4}$ in. Cross feed dials are graduated in thousandths. Rotary feed is positive with a worm-gear ratio of 40:1. The rotary dial is calibrated in 3 minute intervals. The column mounting bracket is also graduated in degrees for angular tilting adjustment.

For further information, *write* Chicago Tool & Engineering Co., 8383 S. Chicago Ave., Chicago 17, Ill.

Device Adjusts to Stack Various Sheet Lengths



SUGGESTED use of an adjustable stacking device: Behind operations such as shearing, blanking, and dry film coating. The sides adjust in or out for width variations and the back guides adjust forward or back-

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ward to accommodate various sheet lengths.

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For further information, *write* Die & Automation Inc., 5353 Dixie Highway, Hamilton, Ohio.

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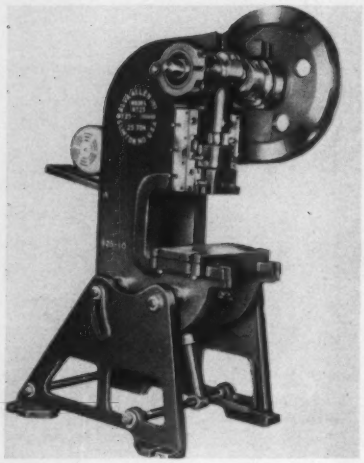

The BT-25 is equipped with a single pin, knife type clutch and can easily be changed from continuous repeat to nonrepeat, single stroke action. Adjustable V-type ram gibs are 14 in. long. Crankshaft diameter at main bearings is 2½ in. with bronze main bearings of 5 in. Die bed is 12 x 21 in. with a bed opening of 5 x 8 in. Mechanical tilting mechanism allows press to incline to 30 degrees.

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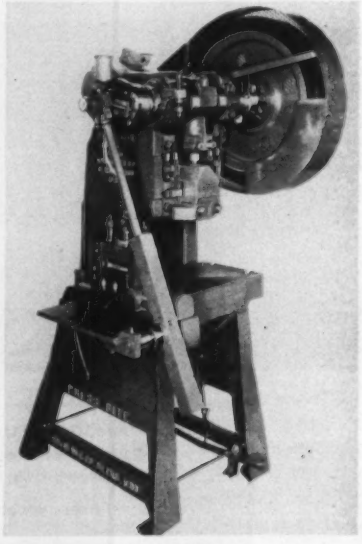

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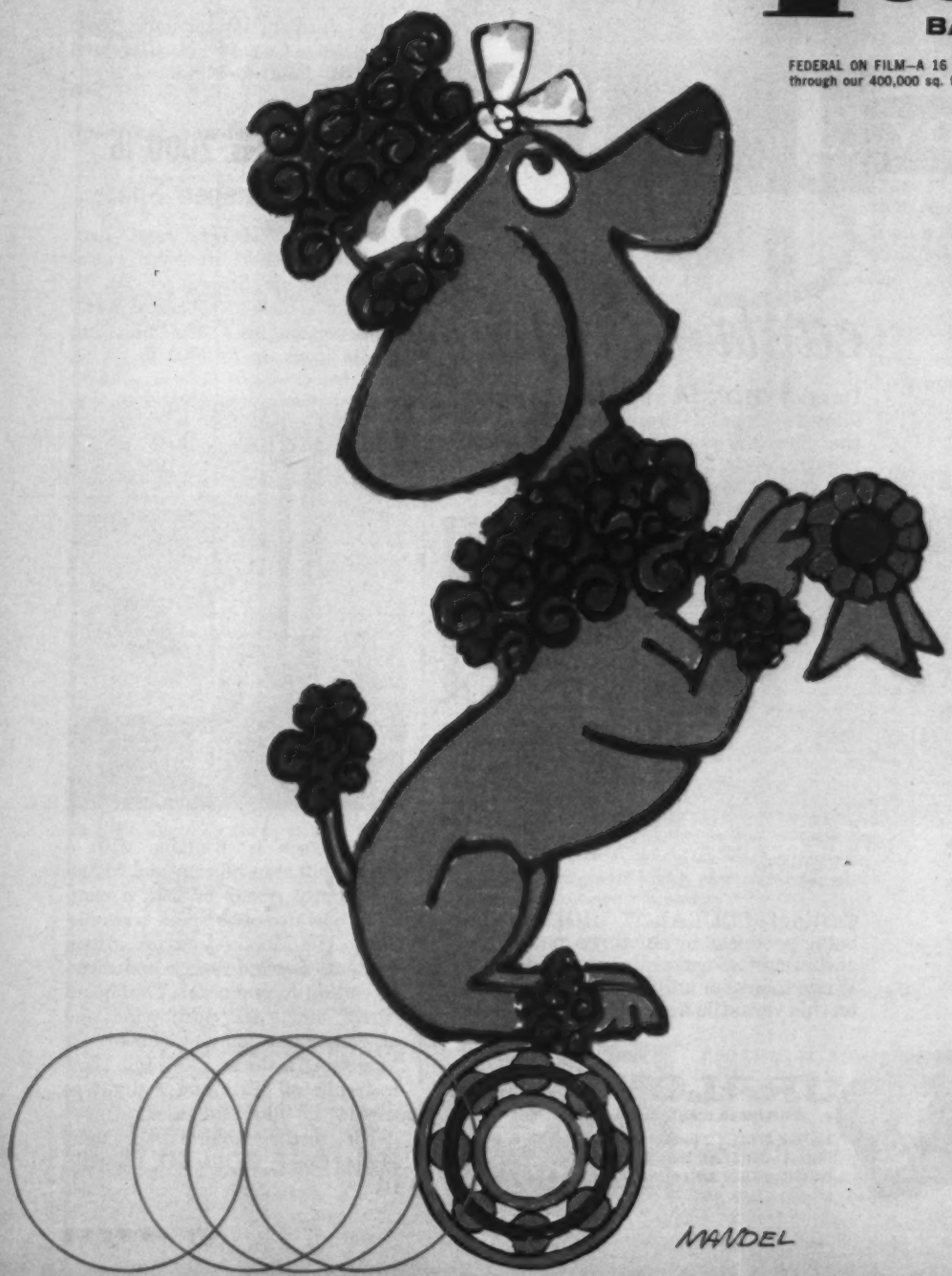

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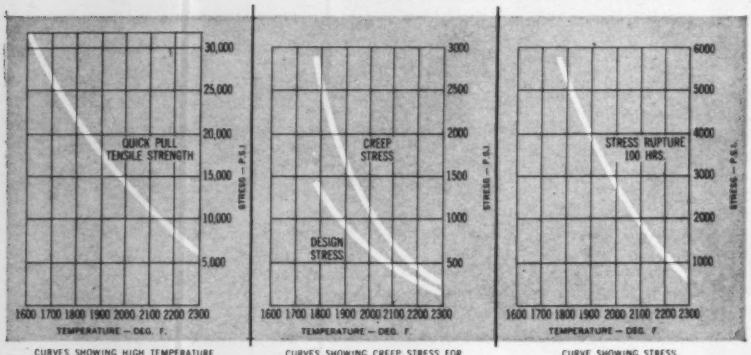

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For further information, *write* Havir Mfg. Co., 444 N. Cleveland Ave., St. Paul 4, Minn.

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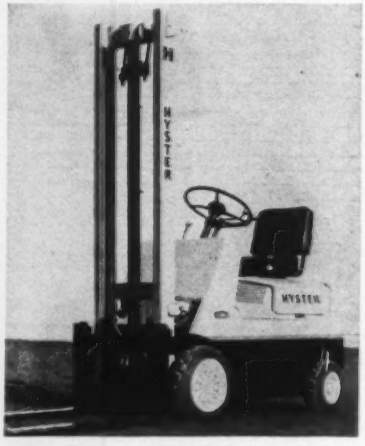
NARROW WIDTH, easy handling, and short turning radius equip Hyster's SpaceSaver 20 lift truck for service in congested warehouse operations. The unit can handle loads up to 2000 lb.



The truck is available with a power shift transmission and Monotrol control system or with a manually operated, two speed transmission. The Monotrol control system combines forward-reverse and throttle control in one pedal. Dashboard "drive" and "park" pushbuttons and an automatic parking brake are Monotrol features. A full flow hydraulic oil filter and a dry type engine air filter are used.

For further information, *write* Hyster Co., P. O. Box 847, Danville, Ill.

NEW Literature

Write directly to the company for a copy

Electroplating Processes

A 24 page bulletin gives a brief description of 18 electroplating processes. Hanson-Van Winkle-Munning Co., Church Street, Matawan, N. J.

High Temperature Alloys

Physical, mechanical, and chemical properties of 17 alloys are compared along with stress rupture data in a 20 page booklet. Data cover the alloys in various forms, such as sheets, bars, and sand and investment castings. Advertising Dept., CP, Haynes Stellite Co., a division of Union Carbide Corp., 270 Park Ave., New York 17, N. Y.

Spherical Powders

An eight page bulletin (Form 1402), covers a new process for producing spherical powders of metals and metal alloys in sizes ranging from 5 to 150 microns. Linde Co., a division of Union Carbide Corp., 270 Park Ave., New York 17, N. Y.

Equipment Leasing Data

"Equipment Leasing Facts; a Single Machine or a Complete Plant," covers benefits, procedures, and cost involved in acquiring or selling machinery and equipment on a rental basis. Armstrong Leasing Corp., 60 E. 42nd St., New York, N. Y.

Tracing Template Set

A 28 part tracing template set determines the correct size and length of boring bars for a given application. Everede Tool Co., 2000 N. Parkside Ave., Chicago 39, Ill.

X-Ray Materials

A 36 page booklet contains details and specifications for preparation of the installation of x-ray shielding and other radiological protection. X-Ray Protective Div., Ameray Corp., Kenvil, N. J.

Hose Style Guide

A guide for proper hose selection, Bulletin No. 627 lists 112 separate liquids and gases, beginning with acetate solvents and ending with zinc salt solutions. Advertising Dept., Aeroquip Corp., Jackson, Mich.

NEW BOOK

American Standard Specifications for Industrial Accident Prevention Signs (Z35.1-1959), Dept. PR167, American Standards Association, 10 E. 40th St., New York, N. Y., $1.35

The standard is a revision of Z35.1-1941 and stresses the need for uniformity. Signs covered in the standard include safety, danger, caution, safety instruction, direction, and information types. Two appendixes (not part of the standard) cover sign construction, materials and finishes, sign locations, and maintenance.

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1960 Output: 100 Million Tons

STEEL PRODUCTION of 100 million tons—sixth largest in the industry's history—is a certainty this year even if operations remain at the current low level.

If steelmaking rates average only 51.4 per cent of capacity the rest of the year, 1960 output will be 6.5 million tons larger than last year's. Operations probably won't get out of the low fifties unless there's a sharp increase in automotive demand; they could dip below 50 per cent if major markets weaken. Since steelmakers must pay double time and a quarter for holiday work, they may decide to bank some of their furnaces and extend Thanksgiving or Christmas shutdowns. If they do, all bets on a 100-million-ton year are off.

Last week's production was about 1,464,000 ingot tons. Industry operations slipped 0.1 percentage point to 51.4 per cent of capacity.

STOCKPILES SHRINKING— Assuming no upturn in ingot production the rest of the year, U. S. consumers will get about 13.8 million tons of finished steel from U. S. mills in the fourth quarter. In addition, they'll get about 550,000 tons from foreign sources, for a total of 14.4 million tons. They'll consume about 16.8 million tons, so they'll have to take the balance—2.4 million tons—out of inventory. By Dec. 31, they'll have only about 9 million tons left—less than they had at the end of last year's strike. If that's the minimum working level—as market analysts hope—consumers will have to start ordering as much metal as they're using. Probable result: Moderate gains for steel production and shipments during next year's first quarter.

MARKET STILL DORMANT— Until users deplete their inventories, there's little likelihood that business will pick up. The outcome of the national elections has had no apparent effect on demand and probably won't for months. Consumers aren't hedging against the possibility of higher prices. They're buying only what they need to keep their production lines running. Deliveries are so fast that there's no incentive for booking ahead.

TUBULAR PRODUCTS DULL— Demand for oil country goods remains sluggish, reflecting the low level of drilling activity and continued liquidation of inventories. October bookings were better than September's, but the tonnage gained was so small that even now most tubemakers are operating at less than 40 per cent of capacity. Line pipe producers are in sorry straits because they've completed most of their big jobs and must wait until the Federal Power Commission approves new projects.

STAINLESS BRIGHTENS— Unlike most of the tonnage products, stainless steel is riding an uptrend. Sales are running well ahead of last month's—when shipments were hindered by the strike against General Electric Co.—and 20 per cent ahead of September's. Plates, sheets, and bars are in fairly strong demand; strip is weak. Market analysts forecast industry shipments of 45,000 tons this month and 40,000 in December. Total for the year: 585,000 tons (vs. 615,000 in 1959).

MORE CANS FOR SOFT DRINKS?— A consumer opinion survey sponsored by Jones & Laughlin Steel Corp., Pittsburgh, shows that "soft drinks are a vast market for tin plated steel cans." Last year, the steel industry shipped 49,103 tons of tin plate for soft drink cans—but they accounted for only 2 per cent of the 35 billion containers that were used. (See Page 61.)

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*Current prices were published in the Nov. 14 issue and will appear in subsequent issues.

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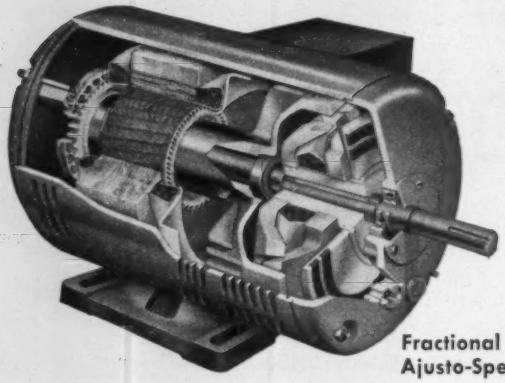
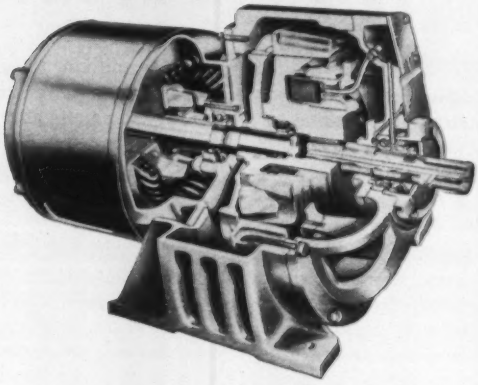


Fractional HP
Ajusto-Spede Drive



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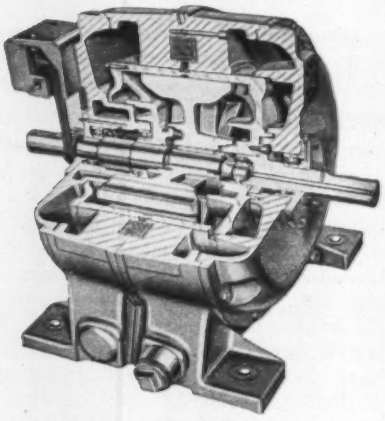
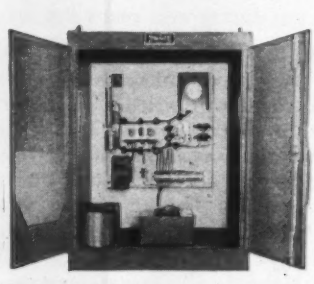


Magnapower Heavy-Duty
Liquid-Cooled Coupling



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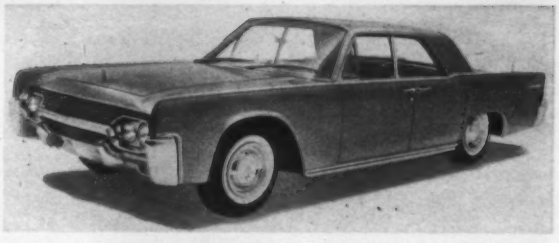
Motordom's search for more effective corrosion control, especially in underbodies, has led to increased use of galvanized sheets. The advent of the unit body has intensified the search for the ideal material. At Ford Motor Co., the Lincoln Continental (right) makes extensive use of fully galvanized (unshaded areas above) and differentially coated, galvanized steel (crosshatched area). In addition to the major parts shown, others include small components, such as spacers and internal parts of structural members. In all, there are about 70 galvanized parts



Automakers Boost Use of Galvanized

WANTED: A sheet that's galvanized on one side and free of scratches and other surface defects on the other side.
REWARD: A vast new market for galvanized steel.
CONTACT: The nearest maker of galvanized steel or any automaker.

Many auto and steel officials place such a product high on their list of "most wanted" materials in their drive to fight corrosion in automobiles. The first company to come up with it will have a competitive advantage in a market limited only by final demand for cars.

Fully galvanized sheets are nothing new to the auto industry. For some time, they have been used on car bodies where rust damage is heaviest. The American Iron & Steel Institute estimates that a standard, 1960 passenger car contains about 25 lb of terne plate and galvanized steel. Detroit sources say more is being used in the 1961 models.

• **Compacts Boost Market** — The compacts, with their unit bodies, have made this market much more attractive to steelmakers than it used to be. AISI estimates that 100 to 150 lb of of terne and galvanized went into a 1960 economy car. If usage were to average out at only 100 lb during the 1961 model run (2.5 million units are anticipated), the market for compacts alone would be 125,000 tons.

But fully galvanized has not been the complete answer to the auto industry's problems. It is difficult to weld economically, although Ford Motor Co. and others have made some progress by varying pressure, dwell time, point shape,

and coolants to minimize zinc pick-up on the electrode tips. (See Mirrors of Motordom, Feb. 22, pp. 49-50.)

Another problem involves the matching of exterior surfaces with other cold rolled sheet panels so that the final paint job will be uniform. One steel official cites another problem: The spangled effect found on many galvanized sheets. (Some companies have eliminated it.)

• **Differentially Coated**—To overcome such problems, auto producers and steelmakers have been experimenting with differentially coated galvanized. Part of the zinc coating on one side is removed by wiping or brushing as the sheet comes out of the continuous bath. Ford has been the biggest buyer, using it on the 1960 Falcons. Reason: Because of the thinner coating, it welds easier than fully galvanized. However, it is generally a premium priced product, taking an extra (about $5 a ton) either for the wiping or for marking—so press operators can tell which side is thin coated.

In addition, the brushing sometimes leaves tiny scratches, so that in areas where exterior appearance is critical, differentially coated doesn't fill the bill—it is reported that Ford is using less of it on the 1961 model Falcons and going back to fully galvanized.

Other problems with differentially coated galvanized: It is difficult to control the weight or thickness of the coating. Uniform specifications have not been developed because a lot of production has been on an experimental or pilot run basis. Producers tell STEEL the thin side runs all the way from one-sixth to one-half the coating on the normal side. Variations may even occur from batch to batch.

• **Ideal Solution**—Both steelmakers and auto producers agree: The ideal product would be galvanized on only one side—to afford maximum protection for the underbody. The "clean" side would permit economical, fast welding and present a surface that matches other cold rolled panels to aid painting. At least three steel companies are working on the process via two different methods.

Fisher Body Div. of General Motors Corp. is working on one-side coated stock with Bethlehem Steel Co. and Republic Steel Corp. Bethlehem is reportedly making it by the electrolytic process, with a coating of 0.0015 in. on the galvanized side. Fisher Body is using about 500 tons a month.

At Republic, the clean side of the sheet is coated with a stopoff, then run through the regular continuous line. The company has been using sodium silicate (water glass) mostly, but finds that the heat of the zinc bath bakes the stopoff onto the sheet. It has to be brushed off, sometimes resulting in surface scratches, making the sheet less than ideal for painting. Republic is trying to find a stopoff agent which will be easy to remove.

• **In the Corvair**—Republic supplies about 300 to 400 tons of the sheets a month to Fisher Body for use on the deck lid of the Corvair

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engine compartment. The lid (two sheets) is built up like a sandwich, with air louvers for engine ventilation. The inside sheet is one-side coated, with the galvanized side facing in—to prevent moisture that enters the louvers from causing corrosion. The side facing the engine is painted.

Republic considers its production as a pilot or experimental project. Current requirements are not sufficient to make full use of one of its continuous lines. In fact, the product is so new that Republic hasn't established a firm pricing policy for it—it's sold at the same price as regular galvanized. (Some producers report a similar price situation for the differentially coated sheets.)

Wheeling Steel Corp. also makes one-side and differentially coated steel—both experimentally. It says it is willing to go into commercial production of differentially coated "when and if demand warrants . . . but automotive firms seem to be the only prospective customers, and they don't seem to know whether they want it or not."

To give you an idea of the market: Fisher Body is using some form of galvanized for 22 to 26 parts in the Corvair body. Ford Motor Co.'s Continental uses galvanized extensively (see photo, Page 133.) Chrysler Corp. is reportedly switching some of its components to galvanized, and American Motors Corp. is using it on rocker panels of the larger Ramblers. (It is reported from Detroit that AMC considers a combination of galvanizing and a complete body dip as the best corrosion protection possible.)

This much is clear: With the trend toward unit bodies and the heavy use of corrosive materials by highway departments in winter, the application of some form of galvanized in auto construction is bound to increase.

Stainless Steel . . .

Stainless Steel Prices, Page 149

Producers of stainless steel report improvement in demand over the last three months. Sales this month are ahead of those in October—when shipments were hindered by the General Electric strike. They're about 20 per cent ahead of September's volume.

Plates, sheets, and bars are in fairly strong demand, but strip is not doing so well.

Many projects requiring stainless are being deferred because of the uncertain business outlook. Postponements are especially noticeable in the paper and petrochemical industries.

It's now estimated the industry shipped about 45,000 tons of stainless and heat resisting steels last month (vs. 42,000 in September). Sellers look for shipments of 45,000 this month, and 40,000 in December. Total for the year is expected to hit 585,000 vs. 615,000 in 1959.

Wire . . .

Wire Prices, Pages 145 & 146

Merchant wire tonnage is available for delivery from stock, and manufacturers' wire can be had in two to five weeks.

Demand for manufacturers' and spring wire for prompt shipment is slightly higher. Tonnage is going

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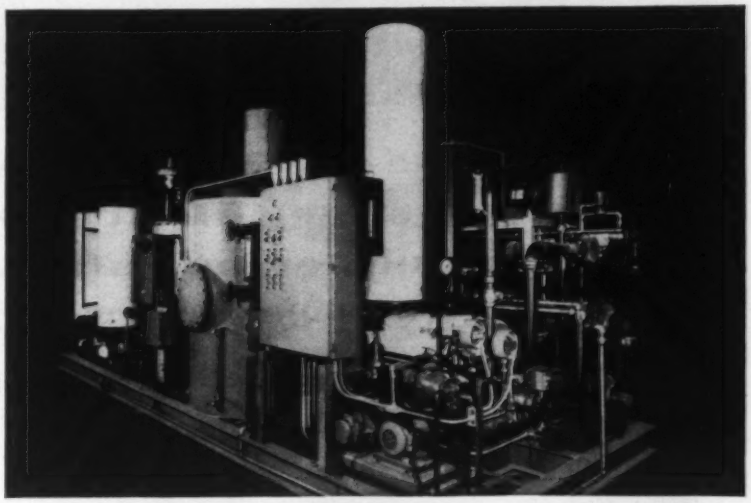

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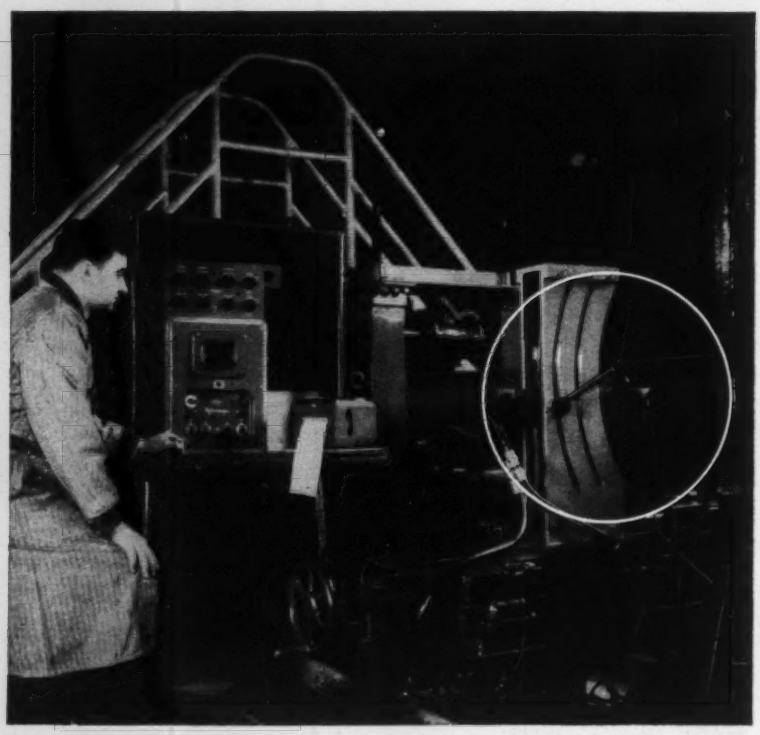
You get full capacity and the dryness and purity you specified in quality-built packaged units that are set on a common base and completely factory tested prior to shipment. And, you can rely on the best factory trained service team in the business whenever your operation calls for it.

It's this kind of customer service that has made Gas Atmospheres Packaged Generators the most popular units working today. Gas Atmospheres makes a complete line of Packaged Generators for inert, CO_2, nitrogen, hydrogen, reducing and annealing gases. Literature available. Write *Gas Atmospheres, Inc., 3855 West 150 Street, Cleveland 11, Ohio.*



Sperry Ultrasonic Inspection at 150 feet per minute...

assures pipe weld quality

Sperry ultrasonic engineers, located in all major industrial areas are available for consultation on your automated or manual testing problems.

Call on Sperry experience and research for a solution.

The weld in line pipe for the oil and gas industry must not fail. Yet speed of production also remains an economically important must.

Sperry engineers, working with Jones & Laughlin production engineers, developed a method of integrating the necessary ultrasonic weld inspection into the J & L 150-feet-per-minute electricweld production line.

In operation, the Sperry angle beam search head contacts the pipe as it moves through the mill, and all defect indications are monitored by a Sperry R.A. unit to flash a light, to relay the signal of the defect to a pen recorder and to actuate controls to dye mark the flaw area.

Sperry Products Company
DIVISION OF HOWE SOUND COMPANY

912 Shelter Rock Road, Danbury, Connecticut

directly into production rather than inventory. Makers of high carbon and specialty wire are operating at a fair rate, one New England producer being engaged at 75 per cent of capacity.

An outstanding inquiry calls for 528,000 squares of noncorrosive (stainless) fabric, closing Nov. 29 by the U. S. Engineer, Memphis, Tenn.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 144 & 145

Consumers are buying sheets for immediate needs only, with mills offering shipments of hot rolled in two to three weeks, cold rolled in two to five weeks (especially where hot bands are readily available). Most sheet mills have good supplies of bands.

In some cases, automotive shipments have been shoved back a month or more. Buying by household appliance manufacturers, makers of door bucks, and office furniture is off seasonally. Demand for steel for shipping containers is slow.

Users plan to keep inventories down at yearend because of taxes. Shipments this quarter, however, will better third quarter volume. Not much talk is heard of a possible price increase Dec. 1 to offset a scheduled wage hike.

Bids are being closed on 387,930 enameled exterior, 55 gallon steel drums by the Army Quartermaster Depot, Richmond, Va. It's the largest inquiry for enameled steel drums to come out this year. Contracts are also being placed for nearly 1.4 million ammunition boxes, 16 to 26 gage sheets, by the Ordnance Ammunition Command, Joliet, Ill.

Distributors . . .

Prices, Page 150

On a day to day basis, steel service center business is steady. Bookings this month likely will be off from the October total due to fewer working days. They may show further decline in December.

Distributors are losing an increasingly large amount of business to mills which offer prompt delivery at mill prices. That is causing many service centers to offer concessions to secure business. The un-

derlying price structure appears softer than at any time this year.

Following action by the mills, distributors have reduced prices on stainless Type 304 to the same level as Type 302. That is resulting in larger demand for 304.

Tool Steel . . .

Tool Steel Prices, Page 149

Shipments of tool steels (excluding hollow drill steel) in September amounted to 5743 net tons, reports the American Iron & Steel Institute. That compares with 5716 tons in August this year and 5397 tons in September, 1959.

The total movement during the first nine months this year was 69,392 net tons compared with 72,039 tons in the same period last year.

November shipments are expected to equal or slightly better October's, which were 5 to 10 per cent better than September's. Sales have been gradually increasing since August. Automakers have cut their stocks drastically but are depending upon their suppliers to carry inventory for them. Requests for two weeks delivery are common.

The bulk of current demand is from aircraft manufacturers and automakers. The market will get a boost when the car companies start 1962 tooling programs. Some work for castings has already broken loose, but die programs are still three or four months away.

There's no evidence that buyers are protecting themselves against a possible price increase Dec. 1.

Steel Bars . . .

Bar Prices, Page 143

Producers of hot rolled bars aren't happy about the volume of orders they are receiving. Nevertheless, they seem a little more optimistic for the future than they have been recently. Reason: Most customers have reduced inventories to a point where they'll soon have to start buying.

November bookings are expected to equal October's, though the automakers aren't buying as actively as expected, and farm equipment makers and service centers continue to

Capital Cheers Chief

Crowds everywhere cheer Chief Keokuk and the winning Kemco ticket. Steel men and foundrymen hail Kemco Silvery as the superior form of silicon introduction. They know they can count on Kemco's campaign promise of economy and uniformity. This year, and every year, when they want Silicon . . . they choose KEMCO!

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What HORACE DREVER has to say about Lindberg heat treating equipment

Mr. Horace Drever, internationally prominent in the industrial heating field, is a Past-President of the Furnace Manufacturers Association and President of Drever Company, furnace manufacturers and commercial heat treaters.

QUOTE from Mr. Drever's unsolicited letter to Lindberg Engineering Company

"For the past three and one-half years, we have been operating one of your Type 243618 GVRT Furnaces along with a 500 CFH Lindberg Hyen generator in our commercial heat treating division. We are extremely pleased, not only with the fine quality of work turned out by this equipment but also its relatively trouble-free operation. As evidence of our complete satisfaction we have ordered another Lindberg Furnace of this type."

DREVER COMPANY

Lindberg Furnaces in operation at the Drever Company, Bethayres, Pennsylvania.

We are happy that Mr. Drever, a furnace manufacturer in his own right, originally chose Lindberg equipment for his heat treating plant and that its satisfactory service prompted an additional order. The second Lindberg Furnace is now in production at Drever Company, as the adjacent photo shows. Bless those satisfied customers! If you have a product or process in the metal or ceramic field requiring the application of heat you can depend on Lindberg's engineering and design know-how to provide exactly the right equipment to answer your need. Get in touch with your nearest Lindberg Field Representative (see classified phone book) or write direct to Lindberg Engineering Company, 2441 West Hubbard Street, Chicago 12, Illinois. Los Angeles plant: 11937 South Regentview Avenue, Downey, California. In Canada: Birlefco-Lindberg, Ltd., Toronto.

LINDBERG
heat for industry

buy sparingly. The auto builders are providing chief market support. December sales are expected to at least equal November's. An increase in demand for defense needs and arsenals is reported in the East.

Forgers and converters are specifying slowly, reflecting a disappointing business from the automotive industry, builders of machine tools, and industrial equipment.

Keystone Drawn Steel Co., Spring City, Pa., has booked 455 tons of cold finished carbon bars for the Ordnance Corps, Raritan Arsenal, at $100,800.

Tubular Goods . . .

Tubular Goods Prices, Page 149

Oil country goods are moving slowly, reflecting low drilling activity. The latest weekly survey by the Hughes Tool Co. shows 1871 rotary rigs in operation in the U. S. and Canada, 25 more than in the preceding week. In general, the business trend is sidewise, although there are minor, week-to-week fluctuations in orders for tubing and casing.

A recent pickup in inquiries is encouraging to some tubemakers who think customers have reduced their inventories as much as they dare. Orders for 4½ in. casing have improved moderately. November is expected to be a slightly better month than October for bookings.

Merchant pipe distributors' volume is slightly heavier in New England; better than 90 per cent of volume is through distributors. Sellers are holding inventories down, depending on prompt shipments from the mills.

Structural Shapes . . .

Structural Shape Prices, Page 143

Some structural fabricators report a mild pickup. However, the overall trend is off seasonally, and most shops anticipate no broad upswing before the middle of next quarter. Numerous shops may have difficulty maintaining operations at a moderately good rate until that time. So fabricated material prices are likely to continue weak.

Heavier tonnages of fabricated steel are needed for Air Force bases and missile launching sites. Included in numerous programs are liquid oxygen plants (25 ton capacity).

Shops are buying steel close to firm commitments for fabricated tonnage, but they took delivery on more steel during November than in any month of the second half.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

2260 tons, state bridgework, Washington County, Pennsylvania, to the Ft. Pitt Bridge Works, Pittsburgh.

650 tons, municipal powerhouse, Dover, Del., with fabrication by Frank M. Weaver Co., Dover; Kuljan Corp., Philadelphia, is the engineer in charge.

100 tons, highway bridge, Medford, Oreg. (state project) to Gunderson Bros. Engineering Co., Portland, Oreg.

STRUCTURAL STEEL PENDING

722 tons, five state bridges, Route 12, project F-159 (2) Killingly, Conn., bids Nov. 21; also 372 tons of concrete reinforcing steel bars and 45 tons of steel piles.

618 tons, intake bulkhead trashracks and lifting beams, Oahe Reservoir project, Near Pierre, S. Dak.; bids Dec. 8 to the U. S. Engineer, Omaha, Nebr.

398 tons, four state bridges, Danielson connector, Route 12 project F-159(1), Killingly, Conn.; bids Nov. 21; also, 325 tons of concrete reinforcing steel bars and 123 tons of steel piles.

200 tons, including reinforcing (government furnished) Schedule 6, Rocky Reach-Maple Valley, Wash., 345 kv transmission line, involving 75 steel towers; bids to Bonneville Power Administration, Portland, Oreg., Nov. 30.

130 tons, also 100 tons of reinforcing, Turnagain Arm transmission towers, Alaska; bids to Chugach Electric Cooperative, Anchorage, Alaska, Nov. 29.

125 tons, including concrete reinforcing steel bars, three-span welded girder bridge, Hopkinton, N. H.

115 tons, water treatment plant, Anchorage, Alaska; bids late this month.

REINFORCING BARS . . .

REINFORCING BARS PLACED

190 tons, two highway spans, Whatcom County, Washington, to Pacific Coast Div., Bethlehem Steel Co., Seattle; Lockyear & White, Longview, Wash., general contractor at $415,777.

REINFORCING BARS PENDING

2000 tons, grain elevator, Port of Kalama, Wash.; general contract placed.

800 tons or more, Seattle's city hall and garage; bids Dec. 7.

PLATES . . .

PLATES PLACED

250 tons, propane gas storage structure, Minneapolis Gas Co., Savage, Minn., to Chicago Bridge & Iron Co., Chicago.

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when you want it

SINCE 1924 Ulbrich "the biggest little mill in the country"

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PLATES PENDING

335 tons, including several sheet items, Raritan Arsenal, Metuchen, N. J.; bids Nov. 29; additional 235 tons set aside for labor surplus areas.

200 tons, 10,000 barrel, fuel storage tank, Geiger AFB, Washington; bids Dec. 8, to the U. S. Engineer, Seattle.

Unstated tonnage, steel hull derrick boat; bids Dec. 20, U. S. Engineer, Memphis, Tenn.

Unstated tonnage, 100,000 gallon, elevated watertank, service area 7S; bids Nov. 29 to the New Jersey Turnpike Authority, New Brunswick, N. J.

Unstated, 18 to 84 in. tunnel liner plates, Ice Harbor Dam railroad relocation, Washington State; Natt MacDougall Co., Portland, Oreg., low at $1,774,495 to the U. S. Engineer, Walla Walla, Wash.

PIPE . . .

CAST IRON PIPE PLACED

98 tons, 8 to 12 in., Alderwood Manor, Wash., to the U. S. Pipe & Foundry Co., Seattle.

80 tons, 6 to 12 in., for Tacoma, Wash., to Pacific States Cast Iron Pipe Co., Seattle.

RAILS, CARS . . .

RAILROAD CARS PLACED

Chesapeake & Ohio, 350, seventy ton boxcars, to its own shops at Raceland, Ky.

Louisville & Nashville, 25 trailers for piggyback service, with twenty, 40 ft closed vans going to the Kentucky Trailer Co. and five, 35 ft convertible trailers going to the Kingham Trailer Co., Louisville.

Northern Pacific, 50, auto transport racks to Dana Corp.; the racks will be mounted on 85 ft flatcars.

Steel Production Rises Slightly During October

Steel production in October totaled 6,865,000 net tons vs. 6,458,421 tons in the preceding month and 1,704,533 in October, 1959, reports the American Iron & Steel Institute. Output in 1959 was held down by the steel strike.

Operations during the month averaged 54.4 per cent against 52.9 in September this year, and 13.6 in October, last year. The Institute's index of steelmaking for the month (based on average production in 1947-49 as 100) was 96.5 against 93.1 in September and 24.0 in October a year ago.

Despite the sluggish pace of production in recent months, output in the first ten months this year totaled 87,266,440 tons, the sixth largest for any similar period in history. It compares with 74,189,206 in the like period last year.

Through the first ten months, the industry operated at an average of 70.3 per cent of capacity.

The Institute's index of steelmaking for the first ten months this year was 124.7 vs. 106.3 in the same period of 1959.

Steel Ingot Production—October, 1960

Period	OPEN HEARTH (Net tons)	BESSEMER (Net tons)	OXYGEN PROCESS (Net tons)	ELECTRIC (Net tons)	TOTAL (Net tons)	Percentage of capacity
1960						
January	10,510,616	211,132	280,981	1,046,675	12,049,404	95.5
February ...	9,715,527	215,263	245,458	949,558	11,126,806	94.3
March	10,103,122	202,812	306,741	952,008	11,564,683	91.6
1st Qtr	30,329,265	630,207	833,180	2,948,241	34,740,893	93.8
April	8,603,306	105,336	302,763	766,452	9,777,857	80.1
May	7,844,140	73,010	309,505	603,817	8,830,472	70.0
June	6,441,594	80,344	314,766	568,169	7,404,873	60.6
2nd Qtr	22,889,040	258,690	927,034	1,938,438	26,013,202	70.2
1st Half ...	53,218,305	888,897	1,760,214	4,886,679	60,754,095	82.0
July	5,494,331	61,700	289,003	505,890	6,350,924	50.3
August	5,860,394	52,652	279,550	645,404	6,838,000	54.2
*September .	5,525,244	42,228	287,323	603,626	6,458,421	52.9
*3rd Qtr ..	16,879,969	156,580	855,876	1,754,920	19,647,345	52.5
*9 Mo.	70,098,274	1,045,477	2,616,090	6,641,599	80,401,440	72.1
†October ...	5,912,000	57,000	270,000	626,000	6,865,000	54.4
1959						
January	8,280,985	120,005	186,820	729,575	9,317,385	74.3
February ...	8,541,031	128,515	176,970	756,422	9,602,938	84.8
March	10,216,474	184,892	236,595	929,784	11,567,745	92.3
1st Qtr	27,038,490	433,412	600,385	2,415,781	30,488,068	83.8
April	9,884,322	195,730	237,018	964,850	11,281,920	93.0
May	10,117,968	200,887	257,325	1,024,401	11,600,581	92.5
June	9,521,053	185,794	259,731	941,056	10,907,634	89.9
2nd Qtr	29,523,343	582,411	754,074	2,930,307	33,790,135	91.8
1st 6 Mo. ..	56,561,833	1,015,823	1,354,459	5,346,088	64,278,203	87.8
July	4,541,741	66,433	98,634	525,368	5,232,176	41.7
August	1,171,342	.....	.....	267,935	1,439,277	11.5
September ..	1,249,398	.....	.....	285,619	1,535,017	12.7
3rd Qtr	6,962,481	66,433	98,634	1,078,922	8,206,470	22.1
9 Mo.	63,524,314	1,082,256	1,453,093	6,425,010	72,484,673	65.6
October	1,385,490	.....	.....	319,043	1,704,533	13.6
November ..	6,290,659	92,361	129,794	754,793	7,267,607	59.9
December ..	10,468,534	205,666	281,451	1,033,668	11,989,319	95.6
4th Qtr	18,144,683	298,027	411,245	2,107,504	20,961,459	56.3
2nd 6 Mo. ..	25,107,164	364,460	509,879	3,186,426	29,167,929	39.2
Totals	81,668,997	1,380,283	1,864,338	8,532,514	93,446,132	63.3

Note—The percentages are based on annual capacities as of Jan. 1, 1960: Open hearth, 126,621,630 net tons; bessemer, 3,396,000 net tons; basic oxygen process, 4,157,400 net tons; electric and crucible, 14,395,940 net tons. Total: 148,570,970 net tons. In 1959, the capacity tonnages were: Open hearth, 126,528,380 net tons; bessemer, 3,577,000 net tons; basic oxygen process, 4,033,160 net tons; electric and crucible, 13,495,130 net tons. Total: 147,633,670 net tons.
†Preliminary. *Revised.

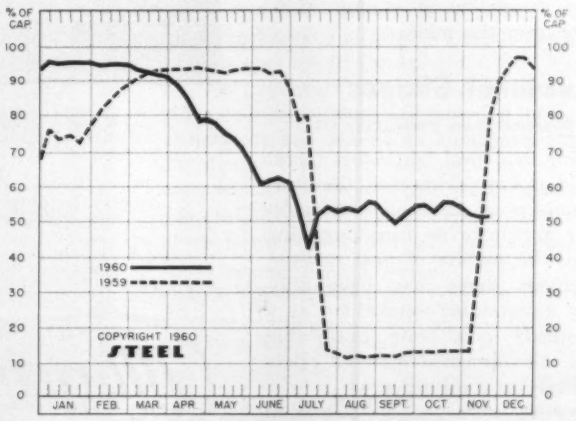
DISTRICT INGOT RATES

(Percentage of capacity utilized)

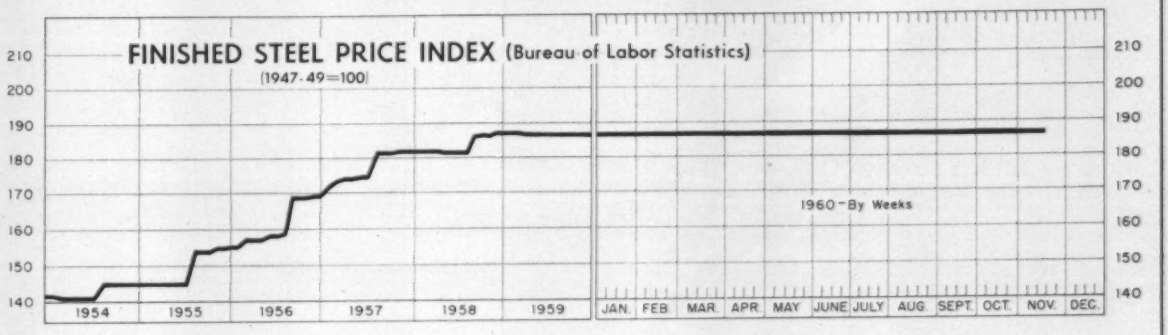
	Week Ended Nov. 20	Week Ago	Month Ago	Year Ago
Northeastern	57	54	57	89
Buffalo	54	54	60	89
Pittsburgh	48	48	48	81
Youngstown	36	38	43	78
Cleveland	54	57	57	76
Detroit	70	68	73	81
Chicago	52	51	56	72
Cincinnati	54	57	61	82
St. Louis	68	75	78	105
Southern	52	53	51	64
Western	48	50	49	80
Total Industry ..	51.4	51.5	54.2	78.9
Index ..... (1947-49=100)	91.1	91.4	98.3	139.0
Net Tons ..... (In thousands)	1,464	1,468	1,579	2,233

Current Week's figures are preliminary. Weekly capacity (net tons): 2,849,306 in 1960 and 2,831,331 in 1959. Source: American Iron & Steel Institute.

NATIONAL STEELWORKS OPERATIONS



Price Indexes and Composites



Nov. 15, 1960	Week Ago	Month Ago	Oct. Index	Year Ago
186.2	186.2	186.2	186.2	186.8

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Nov. 15

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825	Bars, H.R., Carbon	6.675
Rails, Light, 40 lb	7.292	Bars, Reinforcing	6.335
Tie Plates	6.875	Bars, C.F., Carbon	10.710
Axles, Railway	10.175	Bars, C.F., Alloy	14.125
Wheels, Freight Car, 33 in. (per wheel)	62.000	Bars, C.F., Stainless, 302 (lb)	0.570
Plates, Carbon	6.350	Sheets, H.R., Carbon	6.350
Structural Shapes	6.167	Sheets, C.R., Carbon	7.300
Bars, Tool Steel, Carbon (lb)	0.560	Sheets, Galvanized	8.775
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680	Sheets, C.R., Stainless, 302 (lb)	0.658
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400	Sheets, Electrical	12.625
Bars, Tool Steel, H.R. Alloys, High Speed, W18, Cr 4, V 1 (lb)	1.895	Strip, C.R., Carbon	9.489
Bars, H.R., Alloy	10.775	Strip, C.R., Stainless, 430 (lb)	0.480
Bars, H.R., Stainless, 303 (lb)	0.543	Strip, H.R., Carbon	6.250
		Pipe, Black, Buttweld (100 ft)	19.495
		Pipe, Galv., Buttweld (100 ft)	23.098
		Pipe, Line (100 ft)	195.430
		Casing, Oil Well, Carbon (100 ft)	201.080
		Casing, Oil Well, Alloy (100 ft)	315.213
		Tubes, Boiler (100 ft)	51.200
		Tubing, Mechanical, Carbon (100 ft)	27.005
		Tubing, Mechanical, Stainless, 304 (100 ft)	194.268
		Tin plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
		Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.980
		Black Plate, Canmaking Quality (95 lb base box)	7.960
		Wire, Drawn, Carbon	10.575
		Wire, Drawn, Stainless, 430 (lb)	0.685
		Bale Ties (bundles)	7.647
		Nails, Wire, 8d Common	9.433
		Wire, Barbed (80-rod spool)	8.414
		Woven Wire Fence (20-rod roll)	21.008

STEEL's FINISHED STEEL PRICE INDEX

	Nov. 16 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	208.90
Index in cents per lb	6.713	6.713	6.713	6.713	5.659

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$128.14
No. 2 Fdry. Pig Iron, GT.	66.49	66.49	66.49	66.49	58.99
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	58.49
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	59.77
Steelmaking Scrap, GT	28.83	28.83	30.17	44.83	45.67

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Nov. 16 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.65
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.65
Bars, H.R., deld., Philadelphia	5.97	5.97	5.97	5.975	4.90
Bars, C.R., Pittsburgh	7.65*	7.65*	7.65*	7.65*	5.90
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.60
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.60
Shapes, deld., Philadelphia	5.745	5.745	5.745	5.77	4.88
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.50
Plates, Chicago	5.30	5.30	5.30	5.30	4.50
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.80
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.50
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	4.80
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.325-5.425
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.85
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.25
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.35
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.35
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	6.25
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	7.60
Tin Plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.45

*Including 0.35c for special quality.

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$84.50
Wire rods, 7/32-9/16" Pitts.	6.40	6.40	6.40	6.40	5.025

PIG IRON, Gross Ton	Nov. 16 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$59.50
Basic, Valley	66.00	66.00	66.00	66.00	58.50
Basic, deld., Philadelphia	70.18	70.18	70.18	70.41	62.16
No. 2 Fdry, NevilleIsland, Pa.	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, deld., Phila.	70.68	70.68	70.68	70.91	62.66
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	55.00
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	62.70
Malleable, Valley	66.50	66.50	66.50	66.50	59.00
Malleable, Chicago	66.50	66.50	66.50	66.50	59.00
Ferromanganese, net tonst	245.00	245.00	245.00	245.00	190.00

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$26.50	$26.50	$28.50	$45.50	$45.50
No. 1 Heavy Melt, E. Pa.	34.00	34.00	34.00	45.00	47.00
No. 1 Heavy Melt, Chicago	26.00	26.00	28.00	44.00	44.50
No. 1 Heavy Melt, Valley	26.50	26.50	27.50	45.50	48.00
No. 1 Heavy Melt, Cleve.	23.50	23.50	25.50	42.50	45.50
No. 1 Heavy Melt, Buffalo	23.50	23.50	27.50	39.50	43.50
Rails, Rerolling, Chicago	46.50	46.50	48.00	64.50	65.50
No. 1 Cast, Chicago	36.50	36.50	36.50	57.50	47.50

COKE, Net Ton					
Beehive, Furn., Connisvl.	$15.00	$15.00	$15.00	$15.00	$13.625
Beehive, Fdry., Connisvl.	18.25	18.25	18.25	18.25	16.50
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	26.25

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Steel Prices

Mill prices as reported to STEEL, Nov. 16, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 144; footnotes, page 146.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)
Munhall,Pa. U5 .....$76.00

INGOTS, Alloy (NT)
Detroit S41 .....$82.00
Economy,Pa. B14 .....82.00
Farrell,Pa. S3 .....82.00
Lowellville,O. S3 .....82.00
Midland,Pa. C18 .....82.00
Munhall,Pa. U5 .....82.00
Sharon,Pa. S3 .....82.00

BILLETS, BLOOMS & SLABS Carbon Rerolling (NT)
Bartonville,Ill. K4 ...$82.00
Bessemer,Pa. U5 .....80.00
Buffalo R2 .....80.00
Clairton,Pa. U5 .....80.00
Ensley,Ala. T2 .....80.00
Fairfield,Ala. T2 .....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 .....80.00
Johnstown,Pa. B2 ....80.00
Lackawanna,N.Y. B2 ..80.00
Munhall,Pa. U5 .....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 .....80.00
Youngstown R2 .....80.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ....$99.50
Buffalo R2 .....99.50
Canton,O. R2 .....102.00
Clairton,Pa. U5 .....99.50
Conshohocken, Pa.A3..104.50
Ensley,Ala. T2 .....99.50
Fairfield,Ala. T2 .....99.50
Farrell,.Pa. S3 .....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 .....99.50
Geneva,Utah C11 ....99.50
Houston S5 .....104.50
Johnstown,Pa. B2 ....99.50
Lackawanna,N.Y. B2 ...99.50
LosAngles B3 .....109.00
Midland,Pa. C18 .....99.50
Munhall,Pa. U5 .....99.50
Owensboro,Ky. G8 ....99.50
Seattle B3 .....109.00
Sharon,Pa. S3 .....99.50
S.Chicago R2, U5, W14..99.50
S.Duquesne,Pa. U5 ....99.50
S.SanFrancisco B3 ....109.00
Warren,O. C17 .....99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 ...$119.00
Bridgeport,Conn. C32..119.00
Buffalo R2 .....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3 .126.00
Detroit S41 .....119.00
Economy,Pa. B14 .....119.00
Farrell,Pa. S3 .....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 .....119.00
Houston S5 .....124.00
Ind.Harbor,Ind. Y1 ...119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2..119.00
LosAngeles B3 .....139.00
Lowellville,O. S3 ....119.00
Massillon,O. R2 .....119.00
Midland,Pa. C18 .....119.00
Munhall,Pa. U5 .....119.00
Owensboro,Ky. G8 ....119.00
Seattle(6) B3 .....140.00
Sharon,Pa. S3 .....119.00
S.Chicago R2,U5,W14..119.00
S.Duquesne,Pa. U5 ...119.00
Struthers,O. Y1 .....119.00
Warren,O. C17 .....119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 .....$122.50
Canton,O. R2 .....125.00
Cleveland R2 .....122.50
Gary,Ind. U5 .....122.50
S.Chicago,Ill. R2,W14..122.50
S.Duquesne,Pa. U5 ...122.50
Warren,O. C17 .....122.50

SKELP
Aliquippa,Pa. J5 .....5.05
Benwood,W.Va. W10 ...5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. U5 .....5.05
Pittsburgh J5 .....5.05
Warren,O. R2 .....5.05
Youngstown R2, U5 ....5.05

WIRE RODS
AlabamaCity,Ala. R2 ..6.40
Aliquippa,Pa. J5 .....6.40
Alton,Ill. L1 .....6.60
Bartonville,Ill. K4 .....6.50
Buffalo W12 .....6.40
Cleveland A7 .....6.40
Donora,Pa. A7 .....6.40
Fairfield,Ala. T2 .....6.40
Houston S5 .....6.65
IndianaHarbor,Ind. Y1 ..6.40
Johnstown,Pa. B2 .....6.40
Joliet,Ill. A7 .....6.40
KansasCity,Mo. S5 ....6.65
Kokomo,Ind. C16 .....6.50
LosAngeles B3 .....7.20
Minnequa,Col. C10 ....6.65
Monessen,Pa. P7 .....6.40
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 ....6.40
Roebling,N.J. R5 .....6.50
S.Chicago,Ill. R2, W14..6.40
SparrowsPoint,Md. B2 ..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 .....6.50
Struthers,O. Y1 .....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2 ...5.50
Aliquippa,Pa. J5 .....5.50
Atlanta A11 .....5.70
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa. B2 .....5.55
Birmingham C15 .....5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 .....6.30
Gary,Ind. U5 .....5.50
Geneva,Utah C11 .....5.50
Houston S5 .....5.60
Ind.Harbor,Ind. I-2, Y1..5.50
Johnstown,Pa. B2 .....5.55
Joliet,Ill. P22 .....5.50
KansasCity,Mo. S5 ....5.60
Lackawanna,N.Y. B2 ...5.55
LosAngeles B3 .....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 .....5.50
Niles,Calif. P1 .....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 .....6.25
Seattle B3 .....6.25
S.Chicago,Ill. U5, W14 ..5.50
S.SanFrancisco B3 ....6.15
Sterling,Ill. N15 .....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 .....5.50

Wide Flange
Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.50
Fontana,Calif. K1 .....6.45
IndianaHarbor,Ind. I-2..5.50
Lackawanna,N.Y. B2 ....5.55
Munhall,Pa. U5 .....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 .....5.50
Sterling,Ill. N15 .....5.50
Weirton,W.Va. W6 .....5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....6.90
Munhall,Pa. U5 .....6.80
S.Chicago,Ill. U5, W14..6.80

H.S., L.A., Std. Shapes
Aliquippa,Pa. J5 .....8.05
Bessemer,Ala. T2 .....8.05
Bethlehem,Pa. B2 .....8.10
Clairton,Pa. U5 .....8.05
Fairfield Ala. T2 .....8.05
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.05
Geneva,Utah C11 .....8.05
Houston S5 .....8.15
Ind.Harbor,Ind. I-2, Y1..8.05
Johnstown,Pa. B2 .....8.10
KansasCity,Mo. S5 ....8.15
Lackawanna,N.Y. B2 ...8.10
LosAngeles B3 .....8.75
Munhall,Pa. U5 .....8.05
Seattle B3 .....8.80
S.Chicago, Ill. U5, W14..8.05
S.SanFrancisco B3 .....8.70
Sterling,Ill. N15 .....7.75
Struthers,O. Y1 .....8.05

H.S., L.A., Wide Flange
Bethlehem,Pa. B2 .....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ...8.10
Munhall,Pa. U5 .....8.05
S.Chicago,Ill. U5 .....8.05
Sterling,Ill. N15 .....7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 ....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ...5.55
Munhall,Pa. U5 .....5.50
S.Chicago,Ill. I-2, U5 ..5.50

STEEL SHEET PILING
Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ...6.50
Munhall,Pa. U5 .....6.50
S.Chicago,Ill. I-2, U5 ..6.50
Weirton,W.Va. W6 ....6.50

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..5.30
Aliquippa,Pa. J5 .....5.30
Ashland,Ky.(15) A10 ...5.30
Atlanta A11 .....5.50
Bessemer,Ala. T2 .....5.30
Clairton,Pa. U5 .....5.30
Claymont,Del. P4 .....5.30
Cleveland J5, R2 .....5.30
Coatesville,Pa. L7 .....5.30
Conshohocken,Pa. A3 ..5.30
Ecorse,Mich. G5 .....5.30
Fairfield,Ala. T2 .....5.30
Farrell,Pa. S3 .....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 .....5.30
Geneva,Utah C11 .....5.30
GraniteCity,Ill. G4 ....5.40
Harrisburg,Pa. P4 .....5.30
Houston S5 .....5.40
Ind.Harbor,Ind. I-2, Y1 .5.30
Johnstown,Pa. B2 .....5.30
Lackawanna,N.Y. B2 ...5.30
Mansfield,O. E6 .....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 .....5.30
Newport,Ky. A2 .....5.30
Pittsburgh J5 .....5.30
Riverdale,Ill. A1 .....5.30
Seattle B3 .....6.20
Sharon,Pa. S3 .....5.30
S.Chicago,Ill. U5, W14 ..5.30
SparrowsPoint,Md. B2 ..5.30
Sterling,Ill. N15 .....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 .....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abros. Resist.
Claymont,Del. P4 .....7.05
Fontana,Calif. K1 .....7.85
Geneva,Utah, C11 .....7.05
Houston S5 .....7.15
Johnstown, Pa. B2 ....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron
Economy,Pa B14 .....14.10

PLATES, H.S., L.A.
Aliquippa,Pa. J5 .....7.95
Ashland,Ky. A10 .....7.95
Bessemer,Ala. T2 .....7.95
Clairton,Pa. U5 .....7.95
Claymont,Del. P4 .....7.95
Cleveland J5, R2 .....7.95
Coatesville,Pa. L7 ....7.95
Conshohocken,Pa. A3 ..7.95
Economy,Pa. B14 .....7.95
Ecorse,Mich. G5 .....7.95
Fairfield,Ala. T2 .....7.95
Farrell,Pa. S3 .....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 .....7.95
Geneva,Utah C11 .....7.95
Houston S5 .....8.05
Ind.Harbor,Ind. I-2, Y1.7.95
Johnstown,Pa. B2 .....7.95
Munhall,Pa. U5 .....7.95
Pittsburgh J5 .....7.95
Seattle B3 .....8.85
Sharon,Pa. S3 .....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2 ..7.95
Sterling,Ill. N15 .....7.625
Warren,O. R2 .....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy
Aliquippa,Pa. J5 .....7.50
Claymont,Del. P4 .....7.50
Coatesville,Pa. L7 .....7.50
Economy,Pa. B14 .....7.50
Farrell,Pa. S3 .....7.50
Fontana,Calif. K1 .....8.30
Gary,Ind. U5 .....7.50
Houston S5 .....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 .....7.50
Lowellville,O. S3 .....7.50
Munhall,Pa. U5 .....7.50
Newport,Ky. A2 .....7.50
Pittsburgh J5 .....7.50
Seattle B3 .....8.40
Sharon,Pa. S3 .....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint,Md. B2 ..7.50
Youngstown Y1 .....7.50

FLOOR PLATES
Cleveland J5 .....6.375
Conshohocken,Pa. A3 ..6.375
Harrisburg,Pa. P4 ....6.375
Ind.Harbor,Ind. I-2 ....6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
S.Chicago,Ill. U5 .....6.375

PLATES, Ingot Iron
Ashland c.l.(15) A10 ...5.55
Ashland l.c.l.(15) A10 ..6.05
Cleveland c.l. R2 .....6.05
Warren,O. R2 .....6.05

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala.City,Ala.(9) R2 ....5.675
Aliquippa,Pa. (9) J5 ...5.675
Alton,Ill. L1 .....5.875
Atlanta(9) A11 .....5.875
Bessemer, Ala.(9) T2 ...5.675
Birmingham(9) C15 ....5.675
Buffalo(9) R2 .....5.675
Canton,O.(23) R2 .....6.15
Clairton,Pa.(9) U5 ....5.675
Cleveland(9) R2 .....5.675
Ecorse,Mich.(9) G5 ....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala.(9) T2 ...5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1 ...6.375
Gary,Ind.(9) U5 .....5.675
Houston(9) S5 .....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ...5.675
Joliet,Ill. P2 .....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 .....5.675
LosAngeles(9) B3 .....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ...6.025
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 .....6.375
Owensboro,Ky.(9) G8 ..6.025
Pittsburg,Calif.(9) C11..6.375
Pittsburgh(9) J5 .....5.675
Portland,Oreg. O4 ....6.425
Riverdale,Ill.(9) A1 ...5.675
Seattle(9) A24,B3,N15 .6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9) N15..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 .....5.675
Tonawanda,N.Y. B12 ...5.675
Torrance,Calif.(9) C11 .6.375
Warren,O. C17 .....6.025
Youngstown(9) R2,U5..5.675

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.725
Bethlehem,Pa. B2 ....6.725
Bridgeport,Conn. C32 ..6.80
Buffalo R2 .....6.725
Canton,O. R2, T7 .....6.725
Clairton,Pa. U5 .....6.725
Detroit S41 .....6.725
Economy,Pa. B14 .....6.725
Ecorse,Mich. G5 .....6.725
Fairless,Pa. U5 .....6.875
Farrell,Pa. S3 .....6.725
Fontana,Calif. K1 ....7.775
Gary,Ind. U5 .....6.725
Houston S5 .....6.975
Ind.Harbor,Ind. I-2, Y1 6.725
Johnstown,Pa. B2 ....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2 ...6.725
LosAngles B3 .....7.775
Lowellville,O. S3 .....6.725
Massillon,O. R2 .....6.725
Midland,Pa. C18 .....6.725
Owensboro,Ky. G8 ....6.725
Pittsburgh J5 .....6.725
Seattle(6) B3 .....7.825
Sharon,Pa. S3 .....6.725
S.Chicago R2, U5, W14..6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 .....6.725
Warren,O. C17 .....6.725
Youngstown U5 .....6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy
Aliquippa,Pa. J5 .....8.30
Bessemer,Ala. T2 .....8.30
Bethlehem,Pa. B2 .....8.30
Clairton,Pa. U5 .....8.30
Cleveland R2 .....8.30
Ecorse,Mich. G5 .....8.30
Fairfield,Ala. T2 .....8.30
Fontana,Calif. K1 .....9.00
Gary,Ind. U5 .....8.30
Houston S5 .....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 .....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. B2 ...8.30
LosAngeles B3 .....9.00
Pittsburgh J5 .....8.30
Seattle B3 .....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 ....8.30
S.SanFrancisco B3 ....9.05
Sterling,Ill. N15 .....7.925
Struthers,O. Y1 .....8.30
Youngstown U5 .....8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa.(9) B2 ...5.825
Houston(9) S5 .....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 .....5.675
SterlingIll. N15 .....5.775
Sterling,Ill.(1) N15 ....5.675
Tonawanda,N.Y. B12 ...5.675

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 .....5.675
Atlanta A11 .....5.875
Joliet,Ill. P22 .....5.675
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SanFrancisco S7 .....6.52
Seattle B3 .....6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron
Economy,Pa. B14 .....16.45

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....7.05
KansasCity,Mo. S5 ....7.05
Pittsburgh J5 .....6.80
Youngstown U5 .....6.80

BARS, C.F. Loaded (including loaded extra) Carbon
LosAngeles P2, S30 ..11.75*

Alloy
Ambridge,Pa. W18 ..10.175
BeaverFalls,Pa. M12 ..10.175
Camden,N.J. P13 .....10.35
Chicago W18 .....10.175
Elyria,O. W8 .....10.175
Monaca,Pa. S17 .....10.175
Newark,N.J. W18 ....10.35
SpringCity,Pa. K3 .....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ....7.65
BeaverFalls,Pa. M12,R2..7.65
Birmingham C15 .....8.25
Buffalo B5 .....7.70
Camden,N.J. P13 .....8.10
Carnegie,Pa. C12 .....7.65
Chicago W18 .....7.65
Cleveland A7, C20 .....7.65
Detroit B5, P17 .....7.85
Detroit S41 .....7.65
Donora,Pa. A7 .....7.65
Elyria,O. W8 .....7.65
FranklinPark,Ill. N5 ...7.65
Gary,Ind. R2 .....7.65
GreenBay,Wis. F7 .....7.65
Hammond,Ind. J5, L2..7.65
Hartford,Conn. R2 .....8.15
Harvey,Ill. B5 .....7.65
LosAngeles(49) S30 ....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ....7.65
Midland,Pa. C18 .....7.65
Monaca,Pa. S17 .....7.65
Newark,N.J. W18 .....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 .....7.65
Plymouth,Mich. P5 ....7.90
Putnam,Conn. W18 ....8.20
Readville,Mass. C14 ....8.20
Seattle(49) S30 .....9.10
S.Chicago,Ill. W14 ....7.65
SpringCity,Pa. K3 ....8.10
Struthers,O. Y1 .....7.65
Warren,O. C17 .....7.65
Waukegan,Ill. A7 .....7.65
Willimantic,Conn. J5 ...8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Carbon (Turned and Ground)
Cumberland,Md.(5) C19..6.55

BARS, Cold-finished Alloy
Ambridge,Pa. W18 ....9.025
BeaverFalls,Pa. M12,R2 9.025
Bethlehem,Pa. B2 ....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 .....9.025
Camden,N.J. P13 .....9.20
Canton,O. T7 .....9.025
Carnegie,Pa. C12 .....9.025
Chicago W18 .....9.025
Cleveland A7, C20 ...9.025
Detroit B5, P17 .....9.225
Detroit S41 .....9.025
Donora,Pa. A7 .....9.025
Elyria,O. W8 .....9.025
FranklinPark,Ill. N5 ..9.025
Gary,Ind. R2 .....9.025
GreenBay,Wis. F7 ....9.025
Hammond,Ind. J5, L2..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. R5 .....9.025
Lackawanna,N.Y. B3..9.025
LosAngeles P2, S30 ....11.00
Mansfield,Mass. B5 ...9.325
Massillon,O. R2, R8 ...9.025
Midland,Pa. C18 .....9.025
Monaca,Pa. S17 .....9.025
Newark,N.J. W18 .....9.20
Plymouth,Mich. P5 ....9.225
S.Chicago,Ill. W14 ....9.025
SpringCity,Pa. K3 ....9.20

Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025
Waukegan,Ill. A7 ....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2 ..5.675
Atlanta A11 .....5.25
Birmingham C15 .....5.25
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala. T2 .....5.675
Fairless,Pa. U5 .....5.825
Fontana,Calif. K1 ....6.375
Ft.Worth,Tex.(26) T4 ..5.50
Gary,Ind. U5 .....5.675
Houston S5 .....5.675
Ind.Harbor,Ind. I-2,Y1 5.675
Johnstown,Pa. B2 ....5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo. S5 ....5.675
Kokomo,Ind. C16 ....5.775
Lackawanna,N.Y. B2..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.875
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburg,Calif. C11 ...6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SandSprings,Okla. S5 ..5.675
Seattle A24, B3, N14 ..6.425
S.Chicago,Ill. R2, W14.5.675
S.Duquesne,Pa. U5 ....5.675
S.SanFrancisco B3 ...6.425
SparrowsPoint,Md. B2..5.675
Steelton,Pa. B2 .....5.675
Sterling,Ill.(1) N15 ...5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ..6.10
Torrance,Calif. C11 ..6.375
Youngstown R2, U5 ..5.675

BARS, Reinforcing, Billet (Fabricated: to Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Houston S5 .....7.35
Johnstown,Pa. B2 ....7.33
KansasCity,Mo. S5 ....7.35
Lackawanna,N.Y. B2 ..7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 ....7.35
SandSprings,Okla. S5 ...7.35
Seattle A24, B3, N14 ..7.95
SparrowsPoint,Md. B2 ..7.33
St.Paul U8 .....8.17
Williamsport,Pa. S19 ...7.25

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 15.10
Economy,Pa.(D.R.)B14 19.30
Econ.(DirectRolled)B14 13.55
Economy(Staybolt) B14 19.80
McK.Rks.(S.R.) L5 ...14.50
McK.Rks.(D.R.)L5 ...19.80
McK.Rks.(Staybolt)L5. 20.95

BARS, Rail Steel

ChicagoHts.(3) C2, I-2.5.575
ChicagoHts.(4)(44) I-2.5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ....5.575
Franklin,Pa.(4) F5 ....5.675
JerseyShore,Pa.(3) J8 .5.55
Marion,O.(3) P11 ....5.575
Tonawanda(3) B12 ....5.575
Tonawanda(4) B12 ....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ...5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ...5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ...5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 ....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 ....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19Ga. & Lighter)

Niles,O. M21, S3 ....6.275

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ...7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ...5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. 11 ...7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 .....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.225	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	7.225	....
Fairfield,Ala. T2	7.225	7.475
Gary,Ind. U5	7.225	7.475
GraniteCity,Ill.G4	7.325	....
Ind.Harbor I-2	7.225	7.475
Irvin,Pa. U5	7.225	7.475
Kokomo,Ind. C16	7.325	....
MartinsFry. W10	7.225	7.475
Pitts.,Calif. C11	7.975	....
Pittsburgh J5	7.225	....
SparrowsPt. B2	7.225	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ...7.475

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel (Commercial Quality)

Follansbee,W.Va. W10 .7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1) ..9.525

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.275
Irvin,Pa. U5 .....7.275

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Cleveland(28) R2 .....7.65
Niles,O.(28) R2 .....7.65
Weirton,W.Va. W6 ....7.50

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2..6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975*
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ..6.875†
Pittsburg,Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ...6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.
A25 Algoma Steel Corp. Ltd.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N. Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
S46 Steel Co. of Canada

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide MetalsCo.
U13 Union Steel Corp.

V2 Vanadium-Alloy Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala. (27) R2 ..5.10
Allenport,Pa. P7 .....5.10
Alton,Ill. L1 .....5.30
Ashland,Ky.(8) A10 ....5.10
Atlanta A11 .....5.10
Bessemer,Ala. T2 .....5.10
Birmingham C15 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Ind.Harbor,Ind. I-2, Y1 ..5.10
Johnstown,Pa.(25) B2 ..5.10
Lackaw'na,N.Y.(25) B2.5.10
LosAngeles(25) B3 ....5.85
LosAngeles C1 .....8.60
Minnequa,Colo. C10 ....6.20
Riverdale,Ill. A1 .....5.10
SanFrancisco S7 .....6.60
Seattle(25) B3 .....6.10
Seattle N14 .....6.60
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. W14 ....5.10
S.SanFrancisco(25) B3 ..5.85
SparrowsPoint,Md. B2 ..5.10
Torrance,Calif. C11 ....5.85
Warren,O. R2 .....5.10
Weirton,W.Va. W6 .....5.10
Youngstown U5 .....5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18 .....8.40
Farrell,Pa. S3 .....8.40
Gary,Ind. U5 .....8.40
Houston S5 .....8.65
Ind.Harbor,Ind. Y1 .....8.40
KansasCity,Mo. S5 ....8.65
LosAngeles B3 .....9.60
Lowellville,O. S3 .....8.40
Newport,Ky. A2 .....8.40
Sharon,Pa. A2, S3 .....8.40
S.Chicago,Ill. W14 .....8.40
Youngstown U5, Y1 ....8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10 .....7.575
Bessemer,Ala. T2 .....7.575
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.575
Fairfield,Ala. T2 .....7.575
Farrell,Pa. S3 .....7.575
Gary,Ind. U5 .....7.575
Ind.Harbor,Ind. I-2,Y1 7.575
Lackawanna,N.Y. B2..7.575
LosAngeles(25) B3 ....8.325
Seattle(25) B3 .....8.575
Sharon,Pa. S3 .....7.575
S.Chicago,Ill. W14 ....7.575
S.SanFrancisco(25) B3.8.325
SparrowsPoint,Md. B2 .7.575
Warren,O. R2 .....7.575
Weirton,W.Va. W6 ....7.575
Youngstown U5, Y1 ....7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ....5.35
Warren,O. R2 .....5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 .....7.425
Baltimore T6 .....7.425
Boston T6 .....7.975
Buffalo S40 .....7.425
Cleveland A7, J5 .....7.425
Dearborn,Mich. S3 ....7.425
Detroit D2, M1, P20 ..7.425
Dover,O. G6 .....7.425
Evanston,Ill. M22 ....7.525
Farrell,Pa. S3 .....7.425
Follansbee,W.Va. W10 .7.425
Fontana,Calif. K1 .....9.20
FranklinPark,Ill. T6 ..7.525
Ind.Harbor,Ind. Y1 ....7.425
Indianapolis S41 .....7.575
LosAngeles C1, S41 ....9.30
McKeesport,Pa. E10 ..7.525
NewBedford,Mass. R10.7.875
NewBritain,Conn. S15 .7.875
NewCastle,Pa. B4, M23 7.425
NewHaven,Conn. D2 ..7.875
NewKensington,Pa. A6.7.425
Pawtucket,R.I. R3, N8.7.975
Philadelphia P24 .....7.875
Pittsburgh J5 .....7.425
Riverdale,Ill. A1 .....7.525
Rome,N.Y.(32) R6 ....7.425
Sharon,Pa. S3 .....7.425
Trenton,N.J.(31) R5 ..8.875
Warren,O. R2, T5 ....7.425
Worcester,Mass. A7 ...7.975

STRIP, Cold-Rolled Alloy

Boston T6 .....15.90
Cleveland A7 .....15.55
Carnegie,Pa. S18 .....15.55
Dover,O. G6 .....15.55
Farrell,Pa. S3 .....15.55
FranklinPark,Ill. T6 ..15.55
Harrison,N.J. S18 ....15.55
Indianapolis S41 .....15.70
LosAngeles S41 .....17.75
Lowellville,O. S3 .....15.55
Pawtucket,R.I. N8 .....15.90
Riverdale,Ill. A1 .....15.55
Sharon,Pa. S3 .....15.55
Worcester,Mass. A7 ...15.85
Youngstown S41 .....15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7 .....10.80
Dearborn,Mich. S3 ....10.80
Dover,O. G6 .....10.80
Farrell,Pa. S3 .....10.80
Ind.Harbor,Ind. Y1 ....10.80
Sharon,Pa. S3 .....10.80
Warren,O. R2 .....10.80
Weirton,W.Va. W6 .....10.80
Youngstown Y1 .....10.80

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....8.175

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	9.10	...	...	...	...
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	...	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	...
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	...	...
Detroit D2	9.05	10.50	12.70	15.70	...
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.40	12.60	15.60	...
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	...
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	...	...	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	...
LosAngeles S41	11.15	12.60	14.80	...	...
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, M23	8.95	10.40	12.60	15.60	...
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	...
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	...
NewYork W3	...	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	...	10.70	12.90	15.90	18.85
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	18.85	22.95	27.80
Buffalo W12	18.85	...	...
Fostoria,O. S1	19.05	22.15	...
FranklinPark,Ill. T6	19.20	23.30	28.15
Harrison,N.J. C18	18.85	22.95	27.80
NewYork W3	18.85	22.95	27.80
Palmer,Mass. W12	18.85	...	...
Trenton,N.J. R5	18.85	22.95	27.80
Worcester,Mass. A7, T6	18.85	22.95	27.80
Youngstown S41	19.20	23.30	28.15

STRIP, C.R., Electrogalvanized

Cleveland A7 .....7.425*
Dover,O. G6 .....7.425*
Evanston,Ill. M22 ....7.525*
McKeesport,Pa. E10 ...7.50*
NewCastle,Pa. M23 ..7.425*
Riverdale,Ill. A1 ....7.525*
Warren,O. B9, S3, T5.7.425*
Worcester,Mass. A7 ...7.975
Youngstown S41, Y1 .7.425*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Farrell,Pa. S3 .....7.50
Sharon,Pa. S3 .....7.50

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.825
Farrell,Pa. S3 .....5.525
Riverdale,Ill. A1 .....5.675
Sharon,Pa. S3 .....5.525
Youngstown U5 .....5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$9.10	$9.35	$9.75
Fairfield,Ala. T2	9.20	9.45	9.85
Fairless,Pa. U5	9.20	9.45	9.85
Fontana,Calif. K1	9.75	10.00	10.40
Gary,Ind. U5	9.10	9.35	9.75
GraniteCity,Ill. G4	9.20	9.45	9.85
IndianaHarbor,Ind. I-2, Y1	9.10	9.35	9.75
Irvin,Pa. U5	9.10	9.35	9.75
Niles,O. R2	9.10	9.35	9.75
Pittsburg,Calif. C11	9.75	10.00	10.40
SparrowsPoint,Md. B2	9.10	9.35	9.75
Weirton,W.Va. W6	9.10	9.35	9.75
Yorkville,O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)			
Aliquippa,Pa. J5 (21-27 Ga.)	7.90	8.10	...
IndianaHarbor,Ind. Y1 (20-27 Ga.)	7.90	...	...
Niles,O. R2 (20-27 Ga.)	7.90	8.10	8.30

ELECTROLYTIC THIN TIN PLATE (FERROLITE)(¼ lb coating in coils)

	Base Box			
	45 lb	50 lb	55 lb	60 lb
Fairfield,Ala. T2	$6.20	$6.35	$6.50	$6.65
Fairless,Pa. U5	6.20	6.35	6.50	6.65
Gary,Ind. U5	6.10	6.25	6.40	6.55
Irvin,Pa. U5	6.10	6.25	6.40	6.55

TIN PLATE,Hot Dipped 1.25 Common Coke	lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.50	10.75
Fontana,Calif.K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va.W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa,Pa. J5 .....$8.20
Fairfield,Ala. T2 .....8.30
Fairless,Pa. U5 .....8.30
Fontana,Calif. K1 .....8.85

TIGHT COOPERAGE HOOP	0.25 lb	0.50 lb	0.75 lb
Gary,Ind. U5	8.20	8.35	8.50
GraniteCity,Ill. G4	8.30	8.45	8.60
Ind.Harbor,Ind. I-2, Y1	8.20	8.35	8.50
Irvin,Pa. U5	8.20	8.35	8.50
Niles,O. R2	8.20	8.35	8.50
Pittsburg,Calif. C11	8.85	9.00	9.15
SparrowsPoint,Md. B2	8.20	8.35	8.50
Weirton,W.Va. W6	8.20	8.35	8.50
Yorkville,O. W10	8.20	8.35	8.50

HOLLOWARE ENAMELING (Black Plate) (29 Gage)

Aliquippa,Pa. J5 .....7.85
Gary,Ind. U5 .....7.85
GraniteCity,Ill. G4 ....7.95
Ind.Harbor,Ind. Y1 ....7.85
Irvin,Pa. U5 .....7.85
Yorkville,O. W10 .....7.85

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville, O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Mansfield,O. E6	8.10
Vandergrift,Pa. U5	8.10
Warren,O. R2 (Locore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	18.10	19.70	20.20	20.70	15.70††	
Butler,Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coil, annealed; semiprocessed ½c lower. †† Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ...8.00
Aliquippa,Pa. J5 .....8.00
Alton,Ill. L1 .....8.20
Atlanta A1 .....8.00
Bartonville,Ill. K4 .....8.10
Buffalo W12 .....8.00
Chicago W13 .....8.00
Cleveland A7, C20 .....8.00
Crawfordsville,Ind. M8..8.10
Donora,Pa. A7 .....8.00
Duluth A7 .....8.00
Fairfield,Ala. T2 .....8.00
Fostoria,O.(24) S1 ....8.10
Houston S5 .....8.25
Jacksonville,Fla. M8 ..8.35
Johnstown,Pa. B2 .....8.00
Joliet,Ill. A7 .....8.00
KansasCity,Mo. S5 ....8.25
Kokomo,Ind. C16 .....8.10
LosAngeles B3 .....8.95
Minnequa,Colo. C10 ...8.25
Monessen,Pa. P7, P16..8.00
Palmer,Mass. W12 ....8.30
Pittsburg,Calif. C11 ...8.95
Portsmouth,O. P12 ....8.00
Rankin,Pa. A7 .....8.00
S.Chicago,Ill. R2 .....8.00
S.SanFrancisco C10 ....8.95
SparrowsPoint,Md. B2 ..8.10
Sterling,Ill.(1) N15 ....8.00
Sterling,Ill. N15 .....8.10
Struthers,O. Y1 .....8.00
Waukegan,Ill. A7 .....8.00
Worcester,Mass. A7 ....8.30

WIRE, Cold Heading Carbon

Elyria,O. W8 .....8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4 ....12.65
Buffalo W12 .....13.40
Cleveland A7 .....12.65
Donora,Pa. A7 .....12.65
Duluth A7 .....12.65
Johnstown,Pa. B2 .....13.40
KansasCity,Mo. U3 ....12.90
Minnequa,Colo. C10 ...12.775
Monessen,Pa. P7, P16..12.65
Muncie,Ind. I-7 .....13.60
NewHaven,Conn. A7 ...12.95
Palmer,Mass. W12 ....13.70
Pittsburg,Calif. C11 ...13.45
Portsmouth,O. P12 ....12.65
Roebling,N.J. R5 .....12.95
SparrowsPt.,Md. B2 ...13.50
Struthers,O. Y1 .....13.40
Trenton,N.J. A7 .....12.95
Waukegan,Ill. A7 .....12.65
Worcester,Mass. A7 ...12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
Kokomo,Ind. C16 .....9.85
LosAngeles B3 .....10.70
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16..9.75
NewHaven,Conn. A7 ..10.05
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ...10.70
Portsmouth,O. P12 ....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ....10.70
SparrowsPt.,Md. B2 ...9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Worcester,Mass. A7, J4, T6 10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Bartonville,Ill. K4 .....9.85
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Fostoria,O. S1 .....9.80
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
LosAngeles B3 .....10.70
Milbury,Mass.(12) N6 .10.05
Minnequa,Colo. C10 ...9.95
Monessen,Pa. P7, P16..9.75
Muncie,Ind. I-7 .....9.95
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ...10.70
Portsmouth,O. P12 ....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ....10.70
SparrowsPt.,Md. B2 ...9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Wor'ster,Mass.A7,J4,T6 10.05

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1 .....16.50
Bartonville,Ill. K4 ....16.40
Chicago W13 .....16.30
Cleveland A7 .....16.30
Crawfordsville,Ind. M8.16.40
Fostoria,O. S1 .....16.30
Houston S5 .....16.55
Jacksonville,Fla. M8 ..16.65
Johnstown,Pa. B2 ....16.30
KansasCity,Mo. S5 ....16.55
Kokomo,Ind. C16 .....16.30
Minnequa,Colo. C16 ...16.55
Monessen,Pa. P16 ....16.30
Muncie,Ind. I-7 .....16.50
Palmer,Mass. W12 ....16.60
S.SanFrancisco C10 ...17.15
Waukegan,Ill. A7 .....16.30
Worcester,Mass. A7, J6.16.60

ROPE WIRE (A)

Bartonville,Ill. K4 .....13.45
Buffalo W12 .....13.45
Fostoria,O. S1 .....13.45
Johnstown,Pa. B2 ....13.45
Monessen,Pa. P7 .....13.45
Muncie,Ind. I-7 .....13.65
Palmer,Mass. W12 ....13.75
Portsmouth,O. P12 ....13.45
Roebling,N.J. R5 .....13.75
St.Louis L8 .....13.45
SparrowsPt.,Md. B2 ...13.55
Struthers,O. Y1 .....13.45
Worcester,Mass. J4 ....13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Tire Bead

Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7,T6	12.65

NAILS, Stock Sizes

	Col.
AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, CUT (100 lb kegs)

Wheeling,W.Va. W10	$10.10

POLISHED STAPLES

	Col.
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	175
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	177
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

TIE WIRE, Automatic Baler (14½ Ga.) (per 97 lb Net Box) Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	10.51
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	8.88
LosAngeles B3	9.44
Minnequa,Colo. C10	9.02
Pittsburg,Calif. C11	9.44
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.94
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	10.85
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	9.16
LosAngeles B3	9.75
Minnequa,Colo. C10	9.30
Pittsburg,Calif. C11	9.75
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	10.26
SparrowsPt.,Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	10.90
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	10.96
Kokomo,Ind. C16	9.21
LosAngeles B3	9.80
Minnequa,Colo. C10	9.35
Pittsburg,Calif. C11	9.80
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	10.31
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS

	Col.
Birmingham C15	177
Chicago Hts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. P5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	197*
Bartonville,Ill. K4	199
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WIRE (16 gage)	An'ld Stone	Galv. Stone
Ala.City,Ala.R2	17.85	19.40**
Ali'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Chicago W13	17.85	....
Cleveland A7	17.85	....
Craw'sville M8	17.95	19.80†‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	18.95	19.80†‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'lm'r,Mass.W12	18.15	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
St'ling(37) N15	17.95	19.80
SparrowsPt. B2	17.95	19.75§
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....

WOVEN FENCE, 9-15 Ga. Col.

Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½ga.J5	190§
Atlanta A11	191*
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(42) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A1	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

WIRE, Merchant Quality

(6 to 8 gage)	An'ld	Galv.
Ala.City,Ala. R2	9.00	9.55**
Aliquippa J5	8.65	9.325§
Atlanta(48) A11	9.00	9.75*
Bartonville(48) K4	9.85	19.90
Buffalo W12	9.00	9.55†
Chicago W13	9.00	9.55**
Cleveland A7	9.00	....
Crawfordsville M8	9.10	9.80††
Donora,Pa. A7	9.00	9.55†
Duluth A7	9.00	9.55†
Fairfield T2	9.00	9.55†
Houston(48) S5	9.25	9.80**
Jack'ville,Fla. M8	9.10	9.80†‡
Johnstown(48) B2	9.00	9.675§
Joliet,Ill. A7	9.00	9.55†
KansasCity(48)S5	9.25	9.80**
Kokomo(48) S16	9.10	9.65†
LosAngeles B3	9.95	10.625§
Minnequa C10	9.25	9.80**
Monessen(48) P7	8.65	9.35§
Palmer,Mass. W12	9.30	9.85†
Pitts.,Calif. C11	9.95	10.50†
Rankin,Pa. A7	9.00	9.55†
S.Chicago R2	9.00	9.55**
S.SanFran. C10	9.95	10.50**
Spar wsPt.(48)B2	9.10	9.775§
St'ling(37)(48)N15	9.10	9.80
Struthers,O. Y1	9.00	9.65‡
Worcester,Mass.A7	9.30	9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.00c. **Subject to zinc equalization extras.

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in., larger 12.85

⅞ in. and smaller by 6 in. and shorter: 15% off list.

FASTENERS

(Consumer discounts per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent; heavy hex nut 1⅛ in. through 1½ in. tapped 8 threads, add 10 per cent)

HEX HEAD CAP SCREWS, coarse, or fine thread, packaged or bulk, with or without hex nuts, 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

BOLTS, Standard stock sizes:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
*Bulk	50

*Hot galvanized or zinc plated lag bolts only — for package or bulk quantities use applicable list less bulk discounts.

CAP AND SETSCREWS,

Fillister Head, Cap Screws, Coarse Thread:

Packaged	+55
Bulk	+16

Flat Head Cap Screws: ¾ in. and smaller, 6 in. and shorter:

Packaged	+85
Bulk	+38

Setscrews, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam., 6 in. and shorter:

Packaged	+ 5
Bulk	19

Through 1 in. diam., longer than 6 in.:

Packaged	+29

HEXAGON NUTS, American Standard: Finished hex, hex jam, and hex slotted coarse or fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches 1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St. Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.13
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	53.17	40.26
2½	12	49.24	57.72	43.70
2¾	12	54.23	63.57	48.13
3	12	58.73	68.83	52.13
3½	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	Tee Rails All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	7.025

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

SCREW SPIKES

Lebanon,Pa. B2	15.10

TRACK BOLTS, Untreated

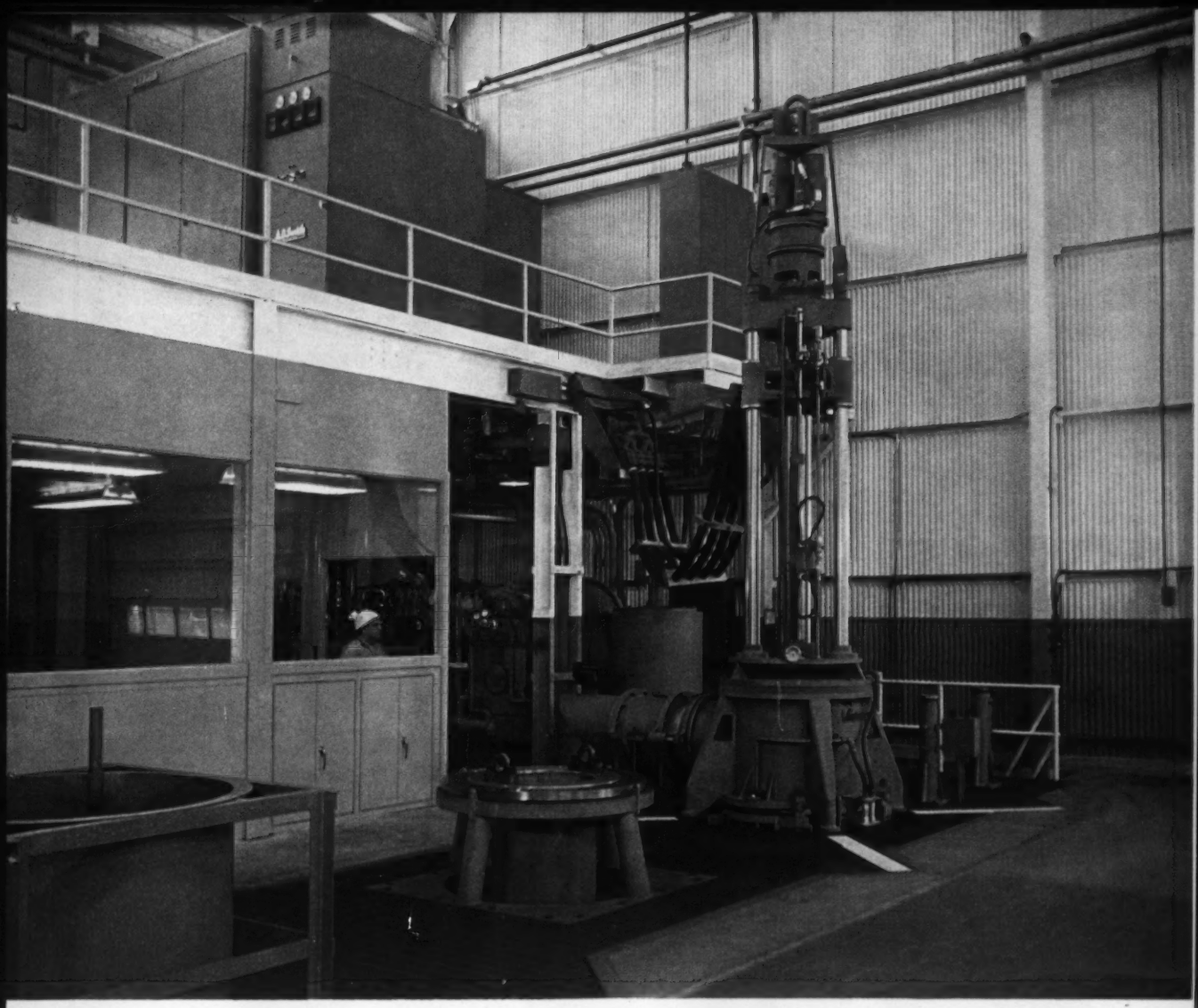
Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

Footnotes

(1) Chicago base.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in.; 6.70c; 1 15/16 to 8 in., inclusive, 7.65c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(12) Worcester, Mass., base.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 5.65c.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds and 2½ in. and smaller hexagons; 9.65c for larger rounds and hexagons and other shapes.



SPECIAL QUALITY STEELS AVAILABLE AT STANDARD

One of the largest vacuum arc remelt furnaces in the country—the first of four to be installed—is now in operation at Standard Steel Works Division of Baldwin-Lima-Hamilton Corp. This new facility, together with electric melting furnace and vacuum degassing equipment acquired recently, now makes it possible for Standard to deliver "laboratory-quality" steels in production quantity.

Standard is now capable of producing vacuum remelt quality ingots, up to 30-inch diameter, in all of the super-strength steels and special alloys requiring exceptional quality. Standard continues to offer superior service and superior materials to American industry. We especially welcome forging and ring inquiries for tools, missiles, turbines, bearings and similar applications for super-strength, heat-resistant, corrosion-resistant and other special alloys.

Standard Steel Works Division
BALDWIN · LIMA · HAMILTON

BURNHAM, PENNSYLVANIA

Rings • Shafts • Car wheels • Gear blanks • Flanges • Special shapes

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"Our people jumped at the chance when we offered the Payroll Savings Plan"

"We invited every employee in the company to come along with us on the Payroll Savings Plan and invest in U.S. Savings Bonds regularly. The response was excellent. People appreciate having the tough job of saving done *for* them—and a lot of them took time to thank us for it. And besides feeling good about building a nest-egg, they're proud to be part of an effort that helps keep our country strong. This Plan makes them feel they 'belong,' and that's the best kind of personnel relations."

If your company hasn't gotten around to putting in the Payroll Savings Plan, contact your State Savings Bonds Director and let him show you how simple the Plan really is. Get his experienced help in presenting the Plan to your organization. Or write Savings Bonds Division, U.S. Treasury Department, Washington, D.C.

ALL U.S. SAVINGS BONDS—OLD OR NEW—EARN ½% MORE THAN BEFORE

STEEL
The Metalworking Weekly

THE U. S. GOVERNMENT DOES NOT PAY FOR THIS ADVERTISEMENT. THE TREASURY DEPARTMENT THANKS, FOR THEIR PATRIOTISM, THE ADVERTISING COUNCIL AND THE DONOR ABOVE.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		8c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.26	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.26	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.26	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 13.00c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	45.75	52.00	52.00
304L	....	37.25	47.25	48.25	52.00	54.50	53.50	59.75	59.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	80.75
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	65.50
330	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	29.25	....	33.25	35.00	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	29.25	31.00	33.25	35.00	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates—Carbon Base 5%	10%	15%	20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	56.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 36.35	43.40
Copper*		

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	....	T-1	1.840
18	4	2	....	....	T-2	2.005
13.5	4	3	....	....	T-3	2.105
18.25	4.25	1	4.75	....	T-4	2.545
18	4	2	9	....	T-5	2.915
20.25	4.25	1.6	12.95	....	T-6	4.330
13.75	3.75	2	5	....	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

Birmingham District	Basic	No. 2 Foundry	Malleable	Bessemer
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	....	74.46	74.46	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
New York, deld.	....	75.41	75.91	....
Newark, N.J., deld	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
Neville Island, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), Aliquippa, del'd.	....	67.95	67.95	68.45
McKees Rocks, Pa. deld.	....	67.60	67.60	68.13
Lawrenceville, Homestead, Wilmerding, Monaca, Pa., deld.	....	68.26	68.26	69.79
Verona, Trafford, Pa., deld.	68.29	68.82	68.82	69.35
Brackenridge, Pa., deld.	68.60	69.10	69.10	69.63
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....
Mansfield, Ohio, deld.	71.30	....	71.80	72.30

Other U. S. Districts	Basic	No. 2 Foundry	Malleable	Bessemer
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
Granite City, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
Sault Ste. Marie, Ont. A25	65.00	65.00	65.50	66.00

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Jackson, Ohio I-3, J1	$78.00
Buffalo H1	79.25

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Calvert City, Ky. P15	$99.00
Niagara Falls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, K2	89.00
Keokuk, Iowa O.H. & Fdry, 14½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	73.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb items (except stainless) ordered by themselves. Prices will vary with total weight of the order or weight of the individual items or both. Base quantities for stainless sheets: 8000 lb, except in Chicago, New York, Boston, Los Angeles, and San Francisco, 10,000 lb. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS				STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Stainless Type 302	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.83	....	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	7.77	8.66	10.06	....	8.28	8.55	11.80	16.38	9.03	8.34	10.02
Birmingham	9.43	10.20	10.46	....	10.41	8.26	13.14	16.76	8.47	8.41	10.05
Boston	9.67	10.58	11.77	53.50	12.16	9.77	13.35	16.59	10.16	9.62	11.08
Buffalo	8.65	9.80	11.25	55.98	11.00	8.75	11.45	16.30	9.15	8.65	11.10
Charlotte, N. C.	9.87	11.22	10.30	....	10.86	9.67	12.68	....	9.88	9.82	11.46
Chicago	8.57	10.20	10.15	52.00	10.74	8.55	10.65	15.95	8.91	8.41	10.48
Cincinnati	8.74	10.26	10.20	65.30	11.06	8.87	11.53	16.27	9.47	8.79	11.01
Cleveland	8.57	9.88	11.24	56.18	10.86	8.66	11.25	16.06	9.30	8.65	10.92
Dallas	9.62	10.05	12.59	....	11.18	9.03	12.98	16.95	9.28	9.35	11.00
Detroit	8.83	10.46	10.50	52.00	11.11	8.86	11.01	16.23	9.47	8.78	10.94
Denver	9.41	11.77	12.11	....	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	9.22	9.65	12.19	52.00	10.78	8.63	13.10	16.55	8.86	8.95	10.60
Indianapolis	9.01	10.64	10.59	....	11.18	8.99	11.09	16.39	9.35	8.85	11.12
Kansas City	9.21	10.87	11.35	....	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	8.95	11.20	11.45	61.27	10.65	9.00	14.20	17.35	9.90	8.40	11.15
Memphis, Tenn.	9.84	10.05	....	....	10.64	9.82	12.74	....	9.16	8.66	11.41
Milwaukee	8.71	10.34	10.29	....	10.88	8.69	10.89	16.09	9.13	8.55	10.82
Moline, Ill.	8.92	10.55	10.50	....	10.90	8.90	11.15	16.45	9.26	8.76	10.96
Newark, N. J.	9.36	10.13	11.35	....	11.46	9.74	13.25	16.40	10.20	9.51	11.05
New York	9.36	10.13	11.35	52.98	11.46	9.74	13.25	16.40	10.20	9.51	11.05
Philadelphia	8.35	9.60	10.66	52.71	10.35	8.75	11.95	16.38	8.95	8.70	9.95
Pittsburgh	8.57	9.88	11.13	52.00	10.84	8.55	11.25	15.95	8.91	8.41	10.68
Portland, Oreg.	9.45	11.30	12.35	....	11.45	9.45	16.65	17.80	10.05	9.60	11.75
St. Louis	8.77	10.58	10.53	....	10.94	8.77	11.28	16.33	9.14	8.62	10.91
St. Paul	8.84	9.59	10.84	....	11.01	8.82	11.49	16.54	9.18	8.68	10.44
San Francisco	10.17	11.69	11.40	54.00	11.78	10.07	15.10	17.25	10.49	10.38	12.47
Seattle	10.51	11.57	12.50	54.02	11.95	9.94	16.20	17.80	10.65	10.10	12.73
Spokane, Wash.	10.36	11.42	12.35	54.02	11.80	9.79	16.20	17.80	10.50	9.95	12.58

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 & 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; stainless, 16 Ga. & 36 in.; hot rolled strip, ¼ in. x 1 in.; hot rolled carbon bars, rounds, ⅝ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅜ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plates, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $146; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Clayburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa.; Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183; Curtner, Calif., $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Vandalia, Mo., New Salisbury, Ohio, $97; Vanport, Pa., Wellsville, Irondale, Ohio, $100; Clearfield, Pa., Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $250; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville Martin, Woodville, Gibsonburg, Nario, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.00.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines; Chewelah, Wash., Luning, Nev., $46; ⅜ in. grains with fines: Baltimore (periclase), $73; Pascagoula, Miss. (periclase), $90.

*—9 in. x 4½ x 2.50 straights.

Ores

Lake Superior Iron Ore

(Prices effective for the 1960 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Lump ⅛ in. and up	12.85
Fines, under ⅛ in.	10.72
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1960; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates ..... nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports	23.00†
Chilean, 62-65%, c.i.f. Atlantic ports	22.00
Brazilian, 68.5% f.o.b. vessel, Victoria, per ton	$11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$19.75-20.00*
Domestic, concentrates, f.o.b. milling points	22.00-23.00

Manganese Ore

Mn 46-58%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charlestown, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†

South African Transvaal

44% no ratio	18.75†
48% no ratio	24.00-26.00†

Turkish

48% 3:1	36.00-37.00†

Domestic

Rail nearest seller

18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked $1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$2.50-2.80
60-65%	2.80-3.20

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

*Before duty. †Nominal.

Canadian Steel

(Cents per lb, f.o.b. mill, except as otherwise noted.)

Billets, Blooms & Slabs:	
Carbon (N.T.):	
Forging	$97.00
Rerolling	78.00
Alloy (N.T.)	115.00
Wire Rods:	
Carbon	5.70
Alloy	6.40
Wire (carload lots):	
Merchant annealed	8.40
Low carbon indus.	7.20
Upholstery spring	8.55
M.B. spring	8.85
Bars & Small Shapes:	
Carbon, merchant	5.30
Carbon, special	5.85
Alloy	6.40
Bar Mill Bands:	
Carbon	5.40
Alloy	8.05
Bars, Reinforcing	5.30
Structural Shapes:	
Standard carbon	5.50
Angles & zees	5.40
Plates, Carbon:	
Sheared	5.45
Universal mill	5.10
Sheets & Coils, Hot Rolled:	
Carbon sheet	4.95
Carbon strip	5.00
Sheets & Coils, Cold Rolled:	
Carbon sheet	6.35
Carbon strip:	
(0.080 and lighter)	6.35
(0.081 and heavier)	6.65
Sheets & Coils, Galvanized:	
Standard quality	6.70
Culvert quality	7.00
Sheets, Porcelain Enameling	7.45
Sheets & Coils, Electrical:	
Field grade	9.00
Armature grade	9.50
Electrical grade	10.15
Sheet Piling	6.15
Skelp	4.70
Rails, Heavy	5.55
Rails, Light	5.70
Joint Bars	6.55
Tie Plates	6.35
Grinding Balls (3 in. diam.)	7.00
Tin Mill (Per base box;	
Products 100 lb base wt)	
Coke tin plate (1.25 lb pot yield)	$10.60
Electrolytic tin plate (0.25 lb coating)	9.10
Black plate	8.30
Nails, Wholesale:	
Carload lots	Col. 110

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $28-$28.50; barge, Brownsville, Tex., $30-$31.

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh, bags	8.10††
Electrolytic Iron,	
Melting stock, 99.9% Fe, irreg. fragments, ⅛ in. x 1.3 in.	28.75
(In contract lots of 750 tons price is 22.75c.)	
Annealed, 99.5% Fe. 36.75, ton, del. east of Mississippi.	
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh)	58.0
Carbonyl Iron:	
90-99.9%, 3 to 20 microns, depending on grade, 88.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum:	
Atomized, 600-lb drum freight allowed, c.l. 39.80; ton lots 41.80	
Brass, 80/20, leaded (60 mesh)	37.60
Bronze powder, 90/10	55.20
Copper, all types	15.25*
Lead	7.50*
Manganese, minus 35 mesh	1.00
Nickel, all types	0.78-1.06
Nickel-Silver	58.80
Solder	8.00*
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Steel, AISI 4650	32.00
Tin	14.00*
Zinc	24.70
Cobalt:	Dollars
98.5%, minus 100-300 mesh	1.57-1.58
99.5%, below 5 microns	2.32
Tungsten	nom.
Molybdenum	4.35

*Plus cost of metal. †Depending on mesh. ‡Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.80
Detroit, ovens	32.00
Pontiac, Mich., deld.	33.95
Saginaw, Mich., deld.	35.53
Erie, Pa., ovens	32.00
Everett, Mass., ovens:	
New England, deld.	33.55*
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.54
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.35
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.68
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

*Within $5.15 freight zone from works.

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes*	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.42	....	$5.32	$5.17	$5.52
Bar Size Angles	5.55	....	5.45	5.30	5.65
Structural Angles	5.45	....	5.35	5.20	5.55
I-Beams	5.45	....	5.35	5.20	5.55
Channels	5.45	....	5.35	5.20	5.55
Plates(basic bessemer)	5.70	....	5.60	5.45	5.80
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	25.50	....	24.70	24.70	25.50
Barbed Wire (†)	6.25	....	6.15	6.00	6.35
Merchant Bars	5.55	....	5.45	5.30	5.65
Hot-Rolled Bands	5.85	....	5.75	5.60	5.95
Wire Rods, Thomas Commercial No. 5	6.05	....	5.95	5.95	6.25
Wire Rods, O. H., No. 5	6.25	....	6.15	6.15	6.45
Bright Common Wire Nails (‡)	6.85	....	6.75	6.60	6.95

*Book closed for 1960-61 shipping season. †Per 82 lb net reel. ‡Per 100-lb keg, 20d nails and heavier.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.

Pure benzene	31.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00

Cents per lb, f.o.b. tank cars or tank trucks, deld.

Phenol, 90 per cent grade	14.75

Per net ton bulk, f.o.b. cars or trucks, plant.

Ammonium sulfate, regular grade	$32.00

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton, Palmerton, Pa. 21-23% Mn, $102.50; 19-21% Mn, 1-3% Si, $100; 16-19% Mn $98. For Neville Island, Pa., prices add $2.50 as of Feb. 1. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Min 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3c for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload, lump, bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.3c from above prices. For 3% grade, Si 12.5-16% deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1.55. Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 28.75c per lb of contained Cr. Deliveerd.

Charge Chrome: Cr 50-56%, C 6-8%, Si 4-7%, 22.00c; Cr 58-63%, C 5.8%, Si 3-6%, 22.50c per lb of contained Cr, carlots, lump, bulk, delivered.

Blocking Chrome: Cr 55-63%, C 4-6%, Si 8-12%, 23.50c per lb of contained Cr, delivered in carlots, lump, bulk.

Refined Chrome: Cr 53-63%, C 3-5%, Si 2.5% max, 26.00c per lb of contained Cr, delivered in carlots, lump, bulk.

Low-Carbon Ferrochrome: Cr 63-66% (Simplex), carload, lump, bulk, C 0.025% max, 33.50c per lb contained Cr; 0.010% max, 34.50c. Delivered.

Cr, 65-71%, carload, lump, bulk, 0.025% max, 35.00c; 0.05% max, 34.00c; 0.10% max, 33.75c; 0.20% max, 33.50c; 0.50% max, 33.25c; 1.0% max, 33.00c; 1.5% max, 32.75c; 2.0% max, 32.50c. Delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C.l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). SM x D, carload, bulk, 20.05c per lb of alloy carload packed 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max, 24.50c per lb contained Cr and 14.60c per lb contained Si; Cr 33-36%, Si 45-48%, C 0.05% max, 24.50c per lb contained Cr, 14.60c per lb contained Si; 0.75 in. x down, 26.25c per lb contained Cr, 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot packed, 2" x D plate (above ⅛" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5 freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.6c per lb contained Si. Packed, c.l. 17.1c, ton lot 18.55c, less ton 20.20c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Chattanooga, Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.7% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lots, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETED ALLOYS

Chromium Briquets: (Weighing approx 3⅝ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l. packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.49 per lb of Mo contained. f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). 5000 lb W or more $2.15 per lb, (nominal) of contained W. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50, (nominal). Delivered.

Ferrotantalum Columbium: (Cb 44-77% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ⅛ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 20% per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

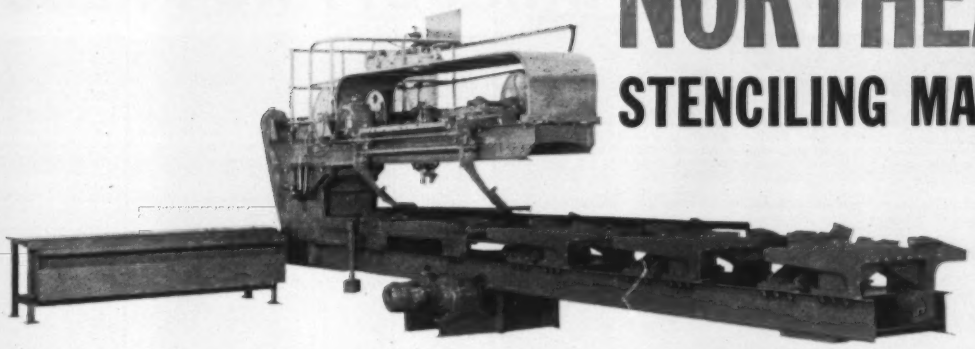
Siminal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c; 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Sigio, Tenn., $120 per gross ton.

Ferromolybdenum: (65-75%). Per lb of contained Mo in 200-lb container, f.o.b. Langeloth and Washington, Pa., $1.76 in all sizes except powdered which is $1.82.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans $1.47; in bags, $1.46, f.o.b. Langeloth and Washington, Pa.

NORTHEAST
STENCILING MACHINES



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Northeast Stenciling Machines take their natural place in the modern production line to eliminate laborious hand operations and reduce production costs by maintaining a synchronized pace with the operation sequence of component equipment.

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By checking the classified pages of STEEL each week you'll be able to find many different types of equipment which will fit your requirements. Used or surplus equipment—you can best find it in STEEL's classified columns.

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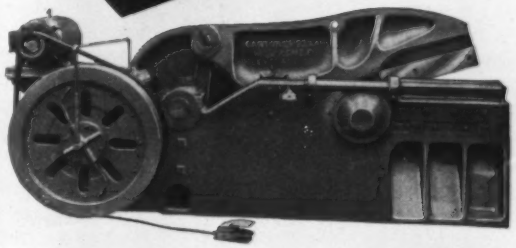

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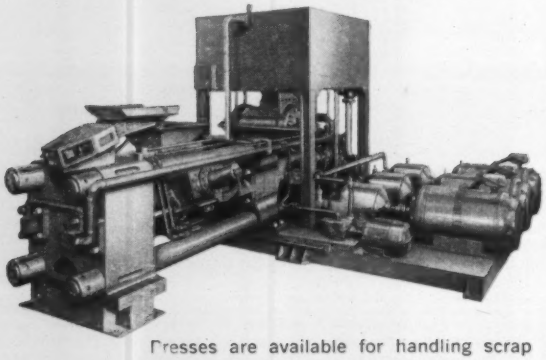

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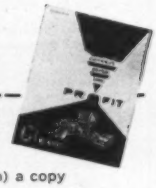

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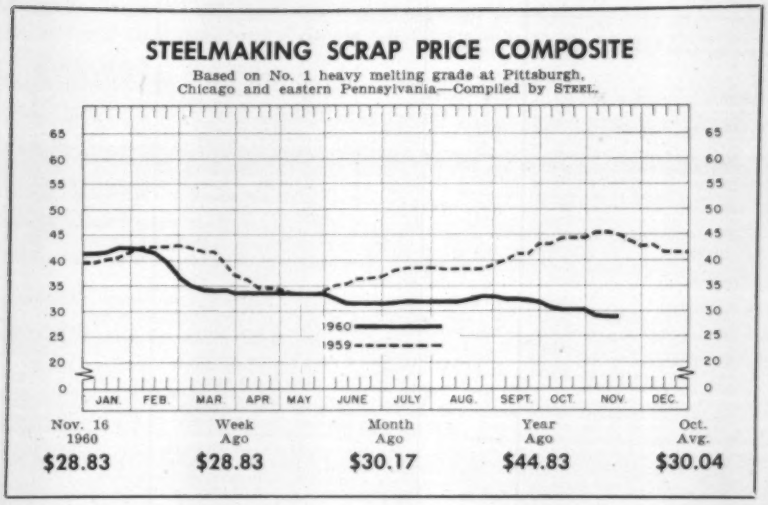


Scrap Immobilized by Slack Demand

STEEL's composite on No. 1 heavy melting grade is holding at $28.83 in face of light buying and unpromising outlook for an early pickup in steelmaking operations

Scrap Prices, Page 156

• **Pittsburgh**—Prices paid for Pennsylvania Railroad's scrap were $2 to $3 a ton below last month's quotations but considerably higher than other railroads have realized in recent sales. PRR's No. 1 heavy melting brought $33.88 a ton (domestic), but none was sold locally. The export price for the same grade was $35.66.

• **Chicago**—Limited buying of scrap and a soft steelmaking rate are holding prices unchanged. Consumers are disinterested in obtaining additional melting material even at the attractive prices quoted. Dealers seem content to sit tight awaiting a turn in the market. Scattered opinion is that the market has bottomed, although the steelmaking rate probably will continue to drag and scrap buying may not pick up appreciably until next quarter.

• **Philadelphia**—Weakness in the scrap market is reflected in a $1 reduction in the price of No. 2 heavy melting steel to $28, delivered, and a drop in other grades. Heavy turnings and couplers, springs, wheels, and shoveling turnings are off $1. Mixed borings and turnings are off nominally $3 a ton. In addition to slack domestic trading, export demand is sliding off some, and prices are easier.

• **New York** — Brokers' buying prices on the major grades of iron and steel scrap are unchanged but easy. Domestic consumption remains light, and were it not for a fair volume of exports, the open hearth grades would be priced even lower than they are. Stainless specialties are down $5 a ton on type 18-8 sheets, clips, and solids to $145-$150; Type 410 is down to $45-$50, Type 430 to $55-$60.

• **Cleveland**—Small orders are moving at prices established earlier this month, based on prices paid for auto list offerings at the end of October. Recently, one large mill at Youngstown bought a representative tonnage of No. 2 heavy melting at $22. Expectations are there will be little market activity until the new auto lists come out at the end of the month.

• **Detroit**—The market continues to sink. Canadian mills have suspended shipments and two mills in this area have put out stop orders on previously committed bundles and turnings. The outlook: Thanksgiving may produce earlier action on monthend auto lists. Brokers and dealers feel prices will drop again.

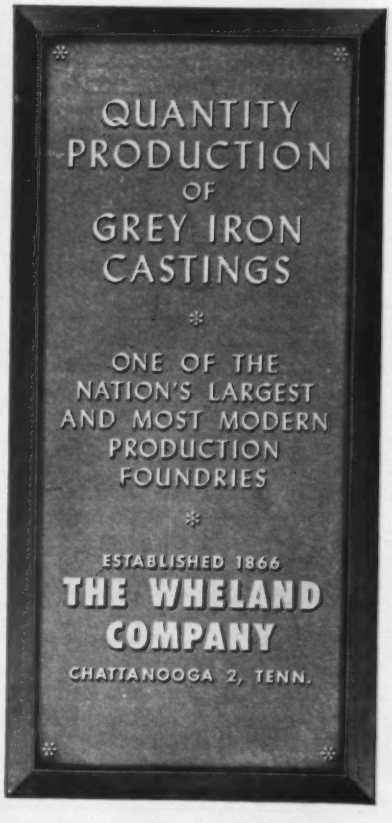
• **Buffalo**—Prices show signs of leveling off following the recent sharp declines. Dealers report that supplies of industrial and dealer material are tending to dry up because of the low prices quoted. However, the dealers have plenty of scrap on hand.

The principal consumer in this district is out of the market for November, and there is some question when the mill will buy for December delivery.

The recent rise in freight rates and the lack of a strong market in other consuming areas are tending to discourage Buffalo dealers from shipping out of the district.

• **Cincinnati**—The market is standing still. Prospects for December business are not encouraging. Sup-

(*Please turn to Page* 161)



Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Nov. 16, 1960. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Nov. 16	$28.83
Nov. 9	28.83
Oct. Avg.	30.04
Nov. 1959	44.33
Nov. 1955	46.33

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	26.00-27.00
No. 2 heavy melting	21.00-22.00
No. 1 dealer bundles	27.00-28.00
No. 2 bundles	20.00-21.00
No. 1 busheling	26.00-27.00
No. 1 factory bundles	30.00-31.00
Machine shop turnings	11.00-12.00
Mixed borings, turnings	11.00-12.00
Short turnings	15.00-16.00
Cast iron borings	15.00-16.00
Cut structurals:	
2 ft and under	33.00-34.00
3 ft and under	32.00-33.00
Heavy turnings	27.00-28.00
Punchings & plate scrap	34.00-35.00
Electric furnace bundles	31.00-32.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Stove plate	32.00-33.00
Unstripped motor blocks	22.00-23.00
Clean auto cast	34.00-35.00
Drop broken machinery	47.00-48.00

Railroad Scrap

No. 1 R.R. heavy melt.	29.00-30.00
Rails, 2 ft and under	*46.00-47.00*
Rails, 18 in. and under	*47.00-48.00*
Random rails	*42.00-43.00*
Angles, splice bars	36.00-37.00
Railroad specialties	*37.00-38.00*
Rails, rerolling	*53.00-54.00*

Stainless Steel Scrap

18-8 bundles & solids	175.00-180.00
18-8 turnings	95.00-100.00
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

CHICAGO

No. 1 hvy melt., indus.	27.00-28.00
No. 1 hvy melt., dealer	24.00-25.00
No. 2 hvy melting	22.00-23.00
No. 1 factory bundles	29.00-30.00
No. 1 dealer bundles	25.00-26.00
No. 2 bundles	16.00-17.00
No. 1 busheling, indus.	27.00-28.00
No. 1 busheling, dealer	24.00-25.00
Machine shop turnings	11.00-12.00
Mixed borings, turnings	13.00-14.00
Shovel turnings	13.00-14.00
Cast iron borings	13.00-14.00
Cut structurals, 3 ft	30.00-31.00
Punchings & plate scrap	32.00-33.00

Cast Iron Grades

No. 1 cupola	36.00-37.00
Stove plate	30.00-31.00
Unstripped motor blocks	28.00-29.00
Clean auto cast	41.00-42.00
Drop broken machinery	41.00-42.00

Railroad Scrap

No. 1 R.R. heavy melt.	28.00-29.00
R.R. malleable	40.00-41.00
Rails, 2 ft and under	42.00-43.00
Rails, 18 in. and under	43.00-44.00
Angles, splice bars	37.00-38.00
Axles	48.00-49.00
Rails, rerolling	46.00-47.00

Stainless Steel Scrap

18-8 bundles, solids	160.00-165.00
18-8 turnings	90.00-95.00
430 bundles & solids	75.00-80.00
430 turnings	40.00-45.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*17.00-18.00*
No. 2 heavy melting	13.00-14.00
No. 1 bundles	*19.00-20.00*
No. 2 bundles	10.00-11.00
No. 1 busheling	*16.00-17.00*
Machine shop turnings	*6.00-7.00*
Mixed borings, turnings	*6.00-7.00*
Shovel turnings	*7.00-8.00*

Cast Iron Grades

No. 1 cupola	*28.00-29.00*
Stove plate	*22.00-23.00*
Heavy breakable	*21.00-22.00*
Unstripped motor blocks	*17.00-18.00*
Charging box cast	23.00-24.00
Clean auto cast	34.00-35.00

CLEVELAND

No. 1 heavy melting	23.00-24.00
No. 2 heavy melting	19.00-20.00†
No. 1 factory bundles	27.00-28.00
No. 1 bundles	23.00-24.00
No. 2 bundles	16.00-17.00
No. 1 busheling	23.00-24.00
Machine shop turnings	10.00-11.00
Shovel turnings	14.00-15.00
Mixed borings, turnings	14.00-15.00
Cast iron borings	14.00-15.00
Cut foundry steel	28.00-29.00
Cut structurals, plate 2 ft and under	31.00-32.00
Low phos. punchings & plate	26.00-27.00
Alloy free, short shovel turnings	14.00-15.00
Electric furnace bundles	24.00-25.00

Cast Iron Grades

No. 1 cupola	37.00-38.00
Charging box cast	24.00-25.00
Heavy breakable cast	26.00-27.00
Stove plate	34.00-35.00
Unstripped motor blocks	28.00-29.00
Brake shoes	35.00-36.00
Clean auto cast	42.00-43.00
Burnt cast	30.00-31.00
Drop broken machinery	42.00-43.00

Railroad Scrap

R.R. malleable	42.00-43.00
Rails, 2 ft and under	45.00-46.00
Rails, 18 in. and under	45.00-46.00
Rails, random lengths	38.00-39.00
Cast steel	32.00-33.00
No. 1 railroad cast	42.00-43.00
Railroad specialties	37.00-38.00
Angles, splice bars	36.00-37.00
Rails, rerolling	51.00-52.00

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	160.00-165.00
18-8 turnings	70.00-75.00
430 clips, bundles, solids	75.00-80.00
430 turnings	20.00-30.00†

YOUNGSTOWN

No. 1 heavy melting	26.00-27.00
No. 2 heavy melting	*21.00-22.00*
No. 1 busheling	26.00-27.00
No. 1 bundles	26.00-27.00
No. 2 bundles	20.00-21.00
Machine shop turnings	12.00-13.00
Shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Low phos.	27.00-28.00
Electric furnace bundles	27.00-28.00

Railroad Scrap

No. 1 R.R. heavy melt.	26.00-27.00

BUFFALO

No. 1 heavy melting	23.00-24.00
No. 2 heavy melting	19.00-20.00
No. 1 bundles	23.00-24.00
No. 2 bundles	16.00-17.00
No. 1 busheling	23.00-24.00
Shovel turnings	13.00-14.00
Machine shop turnings	9.00-10.00
Cast iron borings	11.00-12.00
Low phos. structurals and plates, 2 ft and under	33.00-34.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	38.00-39.00
No. 1 machinery	45.00-46.00

Railroad Scrap

Rails, random lengths	36.00-37.00
Rails, 3 ft and under	42.00-43.00
Railroad specialties	35.00-36.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	22.50-23.50
No. 2 heavy melting	19.50-20.50
No. 1 bundles	22.50-23.50
No. 2 bundles	15.00-16.00
No. 1 busheling	22.50-23.50
Machine shop turnings	8.00-9.00
Mixed borings, turnings	8.00-9.00
Shovel turnings	10.00-11.00
Cast iron borings	10.00-11.00
Low phos. 18 in.	31.00-32.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Heavy breakable cast	28.00-29.00
Charging box cast	34.00-35.00
Drop broken machinery	44.00-45.00

Railroad Scrap

No. 1 R.R. heavy melt.	28.00-29.00
Rails, 18 in. and under	44.00-45.00
Rails, random lengths	36.00-37.00

PHILADELPHIA

No. 1 heavy melting	34.00
No. 2 heavy melting	*28.00*
No. 1 bundles	35.00
No. 2 bundles	19.00
No. 1 busheling	35.00
Electric furnace bundles	36.00
Mixed borings, turnings	*14.00†*
Shovel turnings	*18.00*
Machine shop turnings	13.00
Heavy turnings	*25.00*
Structurals & plates	37.00-39.00
Couplers, springs, wheels	*37.00*
Rail crops, 2 ft & under	47.00-49.00

Cast Iron Grades

No. 1 cupola	38.00
Heavy breakable cast	37.00
Drop broken machinery	48.00-49.00
Malleable	46.00†

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	27.00-28.00
No. 2 heavy melting	18.00-19.00
No. 1 bundles	27.00-28.00
No. 2 bundles	13.00-14.00
Machine shop turnings	4.00-4.50†
Mixed borings, turnings	4.50-5.00†
Shovel turnings	6.00-7.00†
Low phos. structurals & plates	31.00-32.00†

Cast Iron Grades

No. 1 cupola	34.00-35.00
Unstripped motor blocks	23.00-24.00
Heavy breakable	28.00-29.00

Stainless Steel

18-8 sheets, clips, solids	*145.00-150.00*
18-8 borings, turnings	75.00-80.00
410 sheets, clips, solids	*45.00-50.00*
430 sheets, clips, solids	*55.00-60.00*

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	23.00-24.00
No. 2 heavy melting	19.00-20.00
No. 1 bundles	23.00-24.00
No. 1 busheling	23.00-24.00
Machine shop turnings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	30.00-30.50
No. 1 machinery cast	40.00-42.00

BIRMINGHAM

No. 1 heavy melting	*29.00-30.00*
No. 2 heavy melting	22.00-23.00
No. 1 bundles	28.00-29.00
No. 2 bundles	20.00-21.00
No. 1 busheling	29.00-30.00
Cast iron borings	10.00-11.00
Machine shop turnings	*16.00-17.00*
Shovel turnings	*18.00-19.00*
Bar crops and plate	36.00-37.00
Structurals & plate	36.00-37.00
Electric furnace bundles	30.00-31.00
Electric furnace:	
3 ft and under	33.00-34.00
2 ft and under	34.00-35.00

Cast Iron Grades

No. 1 cupola	45.00-46.00
Stove plate	45.00-46.00
Unstripped motor blocks	*32.00-33.00*
No. 1 wheels	34.00-35.00

Railroad Scrap

No. 1 R.R. heavy melt.	32.00-33.00
Rails, 18 in. and under	45.00-46.00
Rails, random lengths	39.00-40.00
Angles, splice bars	37.00-38.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	*27.00*
No. 2 heavy melting	*25.00*
No. 1 bundles	*28.00*
No. 2 bundles	*18.00*
No. 1 busheling	*28.00*
Machine shop turnings	7.50
Shovel turnings	9.50

Cast Iron Grades

No. 1 cupola	39.00
Charging box cast	*33.00*
Heavy breakable cast	*31.00*
Unstripped motor blocks	*33.00*
Clean auto cast	39.00
Stove plate	34.50

Railroad Scrap

No. 1 R.R. heavy melt.	29.00
Rails, random lengths	*34.00*
Rails, rerolling	45.00
Rails, 18 in. and under	*38.00*
Angles, splice bars	33.00

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	*31.50*
No. 2 heavy melting	29.00
No. 1 bundles	*31.50*
No. 2 bundles	20.00
Machine shop turnings	*7.00-8.00†*
Low phos. plate & structurals:	
3 ft	35.00
2 ft and under	37.00-38.00

Cast Iron Grades

No. 1 cupola	34.00-34.50
Heavy breakable	25.00
Foundry malleable	29.00-30.00†
Unstripped motor blocks	28.00-28.50

Railroad Scrap

No. 1 R.R. heavy melt.	*32.00-33.00*

LOS ANGELES

No. 1 heavy melting	*33.00**
No. 2 heavy melting	*29.00**
No. 1 bundles	*30.00†*
No. 2 bundles	*21.00-22.00**
Machine shop turnings	*12.00-15.00†*
Shovel turnings	*13.00-16.00†*
Cast iron borings	*13.00-16.00†*
Cut structurals and plate 1 ft and under	41.00†

Cast Iron Grades

No. 1 cupola	38.00-39.00†

Railroad Scrap

No. 1 R.R. heavy melt.	33.00†

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	*38.00*
No. 2 heavy melting	*35.00*
No. 2 bundles	*19.00*
Shovel turnings	*13.00*
Electric furnace bundles	*46.00*

Cast Iron Grades

No. 1 cupola	*33.00*
Heavy breakable	*31.00*
Unstripped motor blocks	*31.00*
Stove plate (f.o.b. plant)	*18.00*

SEATTLE

(Prepared, f.o.b. car)

No. 1 heavy melting	*35.00*
No. 1 (prepared for shears)	*33.00*
No. 1 hvy (unprepared)	*33.00*
No. 2 heavy melting	*33.50*
No. 2 hvy (unprepared)	*30.00*
No. 2 (prepared for shears)	*28.00*
No. 2 bundles	*20.00*
Shovel turnings	15.00
Electric furnace bundles	*46.00*

Cast Iron Grades

No. 1 cupola	35.00
Heavy breakable cast	*33.00*
Unstripped motor blocks	*30.00*
Stove plate (f.o.b. plant)	20.00

SAN FRANCISCO

No. 1 heavy melting	32.00
No. 2 heavy melting	29.00
No. 1 bundles	27.00-28.00
No. 2 bundles	18.00
Machine shop turnings	14.00
Mixed borings, turnings	14.00
Cast iron borings	14.00
Heavy turnings	14.00
Shovel turnings	14.00
Cut structurals, 3 ft	40.00

Cast Iron Grades

No. 1 cupola	46.00-48.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT.

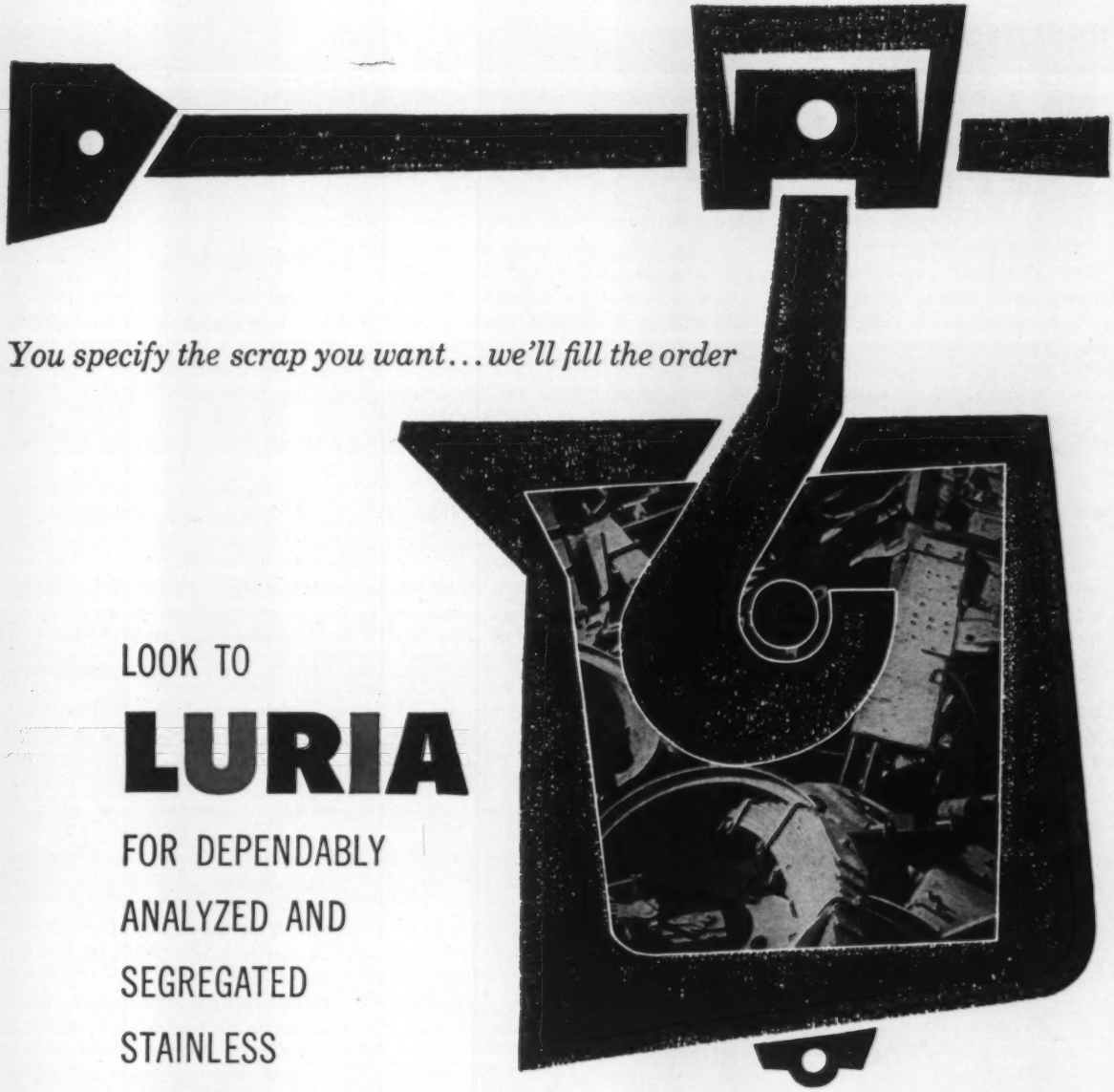
(Brokers' buying prices; net tons)

No. 1 heavy melting	25.80
No. 2 hvy melt, 2 ft & under	25.50
No. 1 bundles	25.80
No. 2 bundles	19.00
Mixed steel scrap	16.00
Mixed borings, turnings	12.00
Busheling, new factory:	
Prepared	25.50
Unprepared	20.45
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	43.00

*For export add $4 dock charges.
†Nominal.
‡F.o.b. Hamilton, Ont.



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Copper Prices Should Hold Through '60

Nonferrous Metal Prices, Pages 160 & 161

THE 30 CENT a pound primary copper price should hold throughout the remainder of 1960. Neither the Presidential elections nor the settlement of the strike at Anaconda's giant Chuquicamata mine in Chile caused anything more than the mildest of flurries on the world market.

• **View of Election**—Here's how metalmen view the influence of a new administration: If the Democrats push a program of public works and stepped up defense spending, then copper would share in the increased business.

The Chuquicamata strike, which began on Oct. 1 and ended last Monday (Nov. 14), accounted for a loss of 35,000 to 40,000 tons of copper.

The probable reason why work resumption didn't have a more depressing effect: Traders anticipated it in their transactions.

Though some production cutbacks have been made throughout the world over the last few months and though the situation remains murky in Africa and Chile (where the possibility of a January strike against Kennecott's El Teniente facility looms), there will be a continuing excess of production over consumption unless sales improve substantially.

• **No Gain in Sight**—So far there's no indication of a sales upswing. October figures released by the Copper Institute show business was worse than most producers thought. Domestic deliveries to fabricators dropped 27,000 tons to 93,451 tons for the second lowest month of the year. Producers' stocks rose to 113,417 tons.

The market hasn't picked up as expected since the U. S. copper strike ended in the first quarter. In fact, many companies will cut back their copper inventories this quarter and the next (see STEEL, Oct. 24, p. 156).

Where Aluminum Goes*

	Quarter Ended June 30	Quarter Ended Mar. 31
Building Products	23.8%	18.6%
Distributors & Jobbers	16.4%	14.1%
Transportation	14.5%	18.0%
Electrical	10.7%	9.6%
Consumer Durable Goods	10.6%	12.6%
Containers & Packaging	9.4%	9.5%
Shipments for Conversion into Wrought Products	6.3%	9.0%
Nonelectrical Machinery & Equip.	3.8%	4.3%
Exports	1.1%	1.0%
All Others	3.4%	3.3%
Total	100.0%	100.0%

*Includes wrought products and permanent mold and sand castings.
Source: Aluminum Association.

In the Markets

• **Nickel Strong Overseas**—Nickel demand in Europe, which has been running at a strong rate all year, looks like it will stay on a plateau for the remainder of 1960. Forecasts are the fourth quarter will wind up about on a par with the third. U. S. sales have been hit by the slowdown in steel, but the fourth quarter looks like it will be up a little over the previous three months. The electroplating market is strong now. And nickel men say they are encouraged by automakers' increased use of stainless below the belt line on '61 models.

• **Titanium and the B-70**—Titanium men are watching the on-again, off-again B-70 supersonic bomber program with more than passing interest. Reason: The B-70 is about 15 per cent titanium (the rest is stainless). Titanium is specified in the engines, landing gears, structural airframe parts, and for fasteners. The military authorized two bombers for flight tests and two for ground tests. But because of destructive testing, a total of 13 planes will have to be built to complete the program. A successful test of the B-70 could pave the way for a Mach 3 civilian transport.

• **Columbium Moves Up**—Columbium sales will wind up the year 30 to 35 per cent better than 1959's, thanks mainly to the big increase in experimental work with the metal. The biggest user is still the nuclear industry. But columbium men believe the metal's future will lie in high temperature aplications such as missiles and rockets and certain industrial uses.

• **Third Beryllium Producer**—Chalk up a third U. S. producer of beryllium. Newly organized General Astrometals Corp., Yonkers, N. Y., will make and market beryllium products under license from the French Metals Co.

BIRMINGHAM—FAirfax 2-2581

BOSTON—HUbbard 2-9830

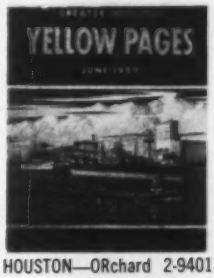
CHICAGO—VAnderbilt 4-4122

DAYTON—KEnmore 6-104

YOU'LL FIND THE ANSWER TO

DENVER—AComa 2-5704

DETROIT—FOrest 6-9626



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Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 50 lb ingots, 26.00, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.90; No. 43, 26.20; No. 195, 27.60; No. 214, 31.50; No. 356, 26.80, 50 lb ingots.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.ob. Laredo, Tex., in bulk. Foreign brands, 99.5%, 26.25-26.75, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment data, f.ob. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.60 per lb deld.
Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55 per lb and up nom.
Copper: Electrolytic, 30.00 deld.; custom smelters, 30.00; lake, 30.00 deld.; fire refined, 29.75 deld.

Germanium: First reduction, ingots, less than 1 kg, 36.00-37.50 per gram; 1-10 kg, 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 11.80; chemical, 11.90; corroding, 11.90, St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld.; 24-99 lb, $9.50; 100-499 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $208-210 per 75 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15-11.50 per lb. depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01; Exton, Pa., basis, add 1.60. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel, 69.60.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.
Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $45-50 per troy oz.

Selenium: $6.50-7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.
Sodium: Solid pack, c.l., 1950; l.c.l, 20.00; brick, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.
Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.
Tellurium: $3.50-5 per lb, 100 lb or more.
Thallium: $7.50 per lb.
Tin: Straits, N. Y., spot, 103.25; prompt, 102.625.
Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max.), $1.50 per lb.
Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.75-2.85 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99+% hydrogen reduced, $3.10-4.00.
Zinc: Prime western, 13.00; brass special, 13.25; intermediate, 13.00. East St. Louis, freight allowed over 0.50 per lb, New York basis, add 0.50. High grade, 14.35; special high grade, 14.50 deld. Diecasting alloy ingot No. 3, 16.25; No. 2, 16.75; No. 5, 16.50 deld.
Zirconium: Reactor grade sponge, 100 lb or less, $8-8.50 per lb; 100-500 lb, $7.25-7.50 per lb, 500-1000 lb, $6.50-7.25; over 1000 lb, $6.50 per lb.
(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 25.00-26.00; No. 12 foundry alloy (No. 2 grade), 22.75; 5% silicon alloy, 0.60 Cu max., 24.00; 13 alloy, 0.60 Cu max., 24.00; 195 alloy, 25.75; 108 alloy, 23.25. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 23.75; grade 2, 22.50; grade 3, 21.50; grade 4, 21.000.

Brass Ingot: Red brass, No. 115, 28.25; tin bronze, No. 225, 38.00; No. 245, 32.50; high-leaded tin bronze, No. 305, 32.75; No. 1 yellow, No. 405, 23.50; manganese bronze, No. 421, 27.50.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb: nom. 1.9% Be alloy.) Strip, $1.945, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.945, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.ob. eastern mills, 20,000-lb lots, 35.35; l.c.l., 35.98. Weatherproof, 20,000-lb lots, 36.30; l.c.l., 37.05.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $17.50 per cwt; pipe, full coils, $17.50 per cwt: traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $3.80-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $14.00-25.00; H.R. strip, $14.00-22.90; C.R. strip, $16.00-35.00; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.40-48.00
0.136-0.096	24-72	72-180	45.90-48.80
0.096-0.077	24-72	72-180	46.40-50.30
0.077-0.068	24-72	72-180	46.90-52.10
0.068-0.061	24-72	72-180	46.90-55.00
0.061-0.048	24-72	72-180	47.40-57.70
0.048-0.038	24-72	72-180	47.90-60.50
0.038-0.030	24-72	72-180	48.40-65.30
0.030-0.024	24-72	72-180	48.90-67.20
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-114	54.60
0.011-0.0095	24-46	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; lengths, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100, 3003-F	44.60	50.90
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4*	51.80	58.90
7075-T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 base, 12 ft lengths

Diam	Round		Hexagonal	
(in.)*	2011-T3	2017-T4	2011-T3	2017-T4
0.125	74.90	77.30	....	....
0.188	63.20	63.20	....	80.10
0.250	60.00	62.60	72.70	74.10
0.375	59.20	63.80	71.00	72.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	63.80	71.00	72.00
0.625	59.20	63.80	67.80	67.90
0.750	57.70	62.00	61.60	63.80
0.875	57.70	62.00	61.60	63.80
1.000	57.70	62.00	61.60	63.80
1.125	55.30	59.50	59.50	61.50
1.250	55.30	59.50	59.50	61.50
1.375	55.30	59.50	59.50	61.50
1.500	55.30	59.50	59.50	61.50
1.625	53.00	56.70	....	59.30
1.750	53.00	56.70	58.30	59.30
1.875	53.00	56.70	....	59.30
2.000	53.00	56.70	58.30	59.30
2.250	51.50	55.00	....	59.30
2.500	51.50	55.00	....	59.30
2.750	49.90	53.20	....	59.30
3.000	49.00	53.20	....	59.30
3.250	....	53.20	....	....
3.375	....	53.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random lengths, diam., 0.375-8 in., "F" temper; 2014, 47.50-57.60; 6061, 43.50-57.60; 7075, 61.80-71.90; 7079, 66.80-76.90.

Pipe: ASA schedule 40, alloy 6063-T6. 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.60
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grade, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24-72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 23.50-24.00; No. 2 heavy copper and wire, 21.75-22.25; light copper, 19.25-20.25; No. 1 composition red brass, 18.50-19.00; No. 1 com-

BRASS MILL PRICES

MILL PRODUCTS a

SCRAP ALLOWANCES e (Based on copper at 30.00c)

	Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	55.13b	52.36c	....	56.32	26.000	26.000	25.250
Yellow Brass	49.27	34.88d	49.56	53.43	20.375	19.625	18.625
Low Brass, 80%	51.75	51.69	52.04	55.81	22.500	22.250	21.750
Red Brass, 85%	52.62	52.56	52.91	56.68	23.250	23.000	22.500
Com. Bronze, 90%	54.03	53.97	54.32	57.84	24.000	23.750	23.250
Manganese Bronze	57.77–57.82	51.42–51.46	61.69	....	19.250	19.000	18.375
Muntz Metal	52.14	47.45	....	....	19.475	19.125	18.625
Naval Brass	54.08	47.89	60.39	58.24	19.125	18.875	18.375
Silicon Bronze	60.45-60.48	59.64–59.67	59.74–59.77	78.89	25.500	25.250	24.500
Nickel Silver, 10%	64.68	67.01	66.76	....	25.125	24.875	12.562
Phos. Bronze, A-5%	75.70	76.20	75.45	77.63	27.125	26.875	25.875

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

position turnings, 17.50-18.00; new brass clippings, 16.00-16.50; light brass, 13.00-13.50; heavy yellow brass, 14.00-14.50; new brass rod ends, 15.00-15.50; auto radiators, unsweated, 14.25-14.75; cocks and faucets, 15.75-16.25; brass pipe, 16.50-17.00.

Lead: Soft scrap lead, 7.75-8.00; battery plates, 3.00; linotype and stereotype, 9.00-9.50; electrotype, 8.00-8.25; mixed babbitt, 9.50-10.00.

Monel: Clippings, 23.00-24.00; old sheets 22.00-23.00; turnings, 16.50-17.50; rods, 22.00-23.00.

Nickel: Sheets and clips, 50.00-51.00; rolled anodes, 50.00-51.00; turnings, 39.00-41.00; rod ends, 50.00-51.00.

Zinc: Old zinc, 3.00-3.50; new diecast scrap, 4.25-4.50; old diecast scrap, 2.75-3.00.

Aluminum: Old castings and sheets, 11.00-11.50; clean borings and turnings, 6.00-6.50; segregated low copper clips, 13.00-13.50; segregated high copper clips, 12.00-12.50; mixed low copper clips, 12.50-13.00; mixed high copper clips, 12.00-12.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 10.00-10.50; clean borings and turnings, 7.00-7.50; segregated low copper clips, 15.00-15.50; segregated high copper clips, 13.50-14.00; mixed low copper clips, 12.50-13.00; mixed high copper clips, 12.00-12.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 10.00; clean borings and turnings, 8.50; segregated low copper clips, 14.00; segregated high copper clips, 13.00; mixed low copper clips, 13.00; mixed high copper clips, 12.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 56.00; light scrap, 51.00; turnings and borings, 36.00.

Copper and Brass: No. 1 heavy copper and wire, 24.50; No. 2 heavy copper and wire, 22.50; light copper, 20.50; refinery brass (60% copper) dry copper content, 21.25.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 24.50; No. 2 heavy copper and wire, 22.50; light copper, 20.50; No. 1 composition borings, 19.50; No. 1 composition solids, 20.50-21.00; heavy yellow brass solids, 15.00-15.50; yellow brass turnings, 14.00-14.50; radiators, 16.00-16.50.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60.

Copper: Flat-rolled, 47.04; oval, 43.50 5000-10,000 lb; electrodeposited, 39.00, 2000-5000 lb lots; cast, 41.50, 5000-10,000 lb quantities.
Nickel: Depolarized, less than 100 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 121.50; 200-499 lb, 120.00; 500-999 lb, 119.50; 1000 lb or more, 119.00.

Zinc: Balls, 20.50; flat tops, 20.50; flats, 23.25; ovals, 22.50, ton lots.

CHEMICALS

Cadmium Oxide: $1.60 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,-000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 15.25; 2000-5900 lb, 13.25; 6000-11,900 lb, 13.00; 12,000-22,900 lb, 12.75; 23,000 lb or more, 12.25.

Nickel Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 5000-9900 lb, 38.00; 10,000 lb or more, 37.00.

Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-800 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 80.10; 100-600 lb, 70.70; 700-1900 lb, 68.00; 2000-9900 lb, 66.10; 10,000 lb or more, 64.80.

Stannous Chloride (Anhydrous): 25 lb, 155.60; 100 lb, 150.70; 400 lb, 148.30; 800-19,900 lb, 107.40; 20,000 lb or more, 101.30.

Stannous Sulphate: Less than 50 lb, 140.70; 50 lb, 110.70; 100-1900 lb, 108.70; 2000 lb or more, 106.70.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page* 155)

plies are coming into yards at a slower pace from country sources. One area consumer has been out of the market for three months, and is not expected to re-enter for some weeks. No. 1 heavy melting is quoted by brokers at $22.50-$23.50.

• **St. Louis** — Most open hearth scrap prices are down $1 to $2 a ton. Among the cast iron grades, charging box, unstripped motors, and heavy breakable are off $1. Random length rails are also off $1, as are 18 in. and under rails. The flow of scrap is dwindling, and prospects for an early improvement are not encouraging.

• **Birmingham** — The downward price trend continues. No. 1 heavy melting steel, machine shop turnings, shoveling turnings, and unstripped motor blocks are all off $1 a ton. Buying is slow, and not much change is anticipated the rest of this year. The foundry industry isn't taking much material.

The export market is quiet. Buyers are pressing for lower prices. Two scrap cargoes left Mobile for Japan last week, and export inquiries are expected to remain quiet for another 30 days or so.

• **Houston**—Prices have declined further. No. 1 heavy melting steel is quoted $31.50 vs. $33 a week ago. No. 1 bundles are down 50 cents to $31.50, while No. 1 railroad heavy melting is quoted off $1 to $32-$33. Dealers anticipate no improvement in the market over the next several weeks.

• **Seattle**—The tone of the market continues soft, and prices have declined another $1 to $2 a ton. Buying is limited because the large consumers are well stocked. The influence of the export situation has declined with a drop in foreign demand. The price list has been revised downward, and further adjustments may be made over the rest of this month. One export cargo is being loaded here for delivery to Japan.

• **Portland, Oreg.** — Prices have been reduced $1 to $2 a ton here—new lists became effective Nov. 14. The action reflects weakness in the markets at other points and the lack of interest in future business by Japanese buyers.

The newly adopted price schedule is considered more in line with quotations at other centers, and dealers will not be surprised if further adjustments are made.

A full cargo for Japan was dispatched last week, and three other shipments are scheduled over the next 30 days. Exporters have their material lined up, and their withdrawal from the market has contributed to the current weakness.

• **Los Angeles**—Demand is at a minimum in this district, and dealers don't anticipate much change in the market the rest of this year. Low prices have reduced the flow of material to dealers' yards.

• **San Francisco**—There has been no change in the market in recent weeks. Dealers say trading has been the dullest in a long time.

Pig Iron . . .

Pig Iron Prices, Page 150

Merchant foundry iron demand is slow. Users are not building inventories and the movement of ton-

CLASSIFIED

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Wheelabrator cabinet will clean tubes, angles, channels, tanks, pipes up to 12" complete with controls and dust collector, suction cabinets, vacuum blaster, hydro-blasters.

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Structural steel shop. 3,000 ton annual capacity. Central California, fast growth area. $110,000 for land, building, and equipment, or will lease to responsible and experienced parties. Box 883, STEEL, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

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Age 30 to 35. Graduate Industrial or Mechanical Engineer. Heavy supervisory experience and some knowledge in steel plate, alloy and structural fabrication. This is an outstanding position having unlimited opportunity for advancement with well-established firm in the Chicago area. Reply Box 882, STEEL, Penton Bldg., Cleveland 13, Ohio.

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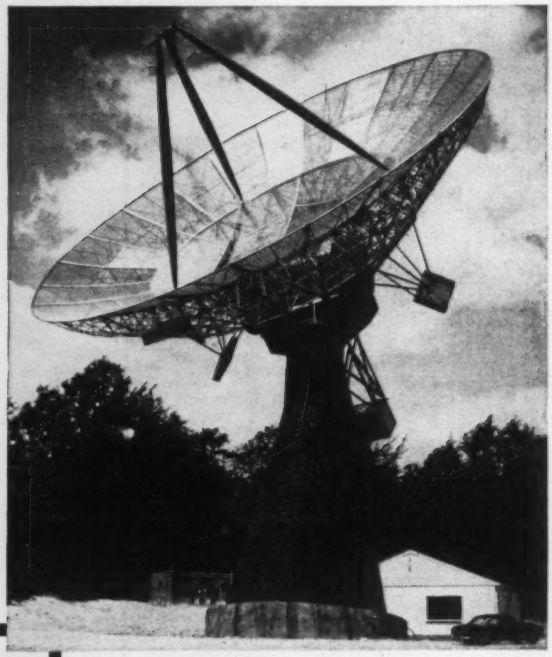

CONE-DRIVE GEARS

DIVISION MICHIGAN TOOL CO.
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It takes real accuracy in gearing to turn an 84-ft. radio telescope at that speed. Backlash on the Cone-Drive **double-enveloping worm** gear set used in the complex drive system was held to 0.0012-inch.

Dependable Cone-Drive gearing is available in gearsets, speed reducers and gearmotors.

nage will be off seasonally the rest of this year. Navigation on the Great Lakes is drawing to a close for the 1960 season. There has not been the customary last-minute rush of pig iron shipments to Upper Lake ports.

Supply is ample on the Troy, N. Y., base with stocks available for transshipment of Buffalo iron from Beacon, N. Y.

A blast furnace at Swedeland, Pa., has gone back into production. A second stack at that point, however, is likely to go down soon for relining.

Iron Ore . . .

Iron Ore Prices, Page 151

Pittsburgh Steamship Div., U. S. Steel Corp., loaded its final cargo of Lake Superior iron ore of the 1960 lake navigation season Nov. 13. The cargo was taken on at Two Harbors, Minn., for delivery to Conneaut, Ohio.

The Lake Carriers' Association, Cleveland, reports iron ore shipments in October totaled 7,013,603 gross tons vs. 1,096,450 in October, 1959, and 8,480,635 in October, 1958. The total movement for the 1960 navigation season through October was 67,694,037 gross tons vs. 38,230,585 last year and 48,264,152 in 1958.

Plates . . .

Plate Prices, Page 143

Plate business seems to be slower, with no early improvement expected. Some producers anticipate no important gain before next spring. Deliveries on sheared and universal plates range ten days to two weeks; on alloy plates, three to five weeks.

Shipwork is showing a little life, but specifications from tank fabricators, the railroads, and pipe fabricators remain light. Bethlehem Steel's Sparrows Point, Md., shipyard is low bidder on four cargo ships for Lykes Bros. Steamship Co., New Orleans. Each vessel will take 7000 tons of steel, mostly plates. A subcontract for about 1000 tons of plates for a discharge pipe for the Chief Joseph Dam project in Oregon is pending.

Kaiser Steel Corp., Oakland, Calif., will roll 110,000 tons of plates for Pacific Gas & Electric Co.'s gas pipeline from Canada to California.

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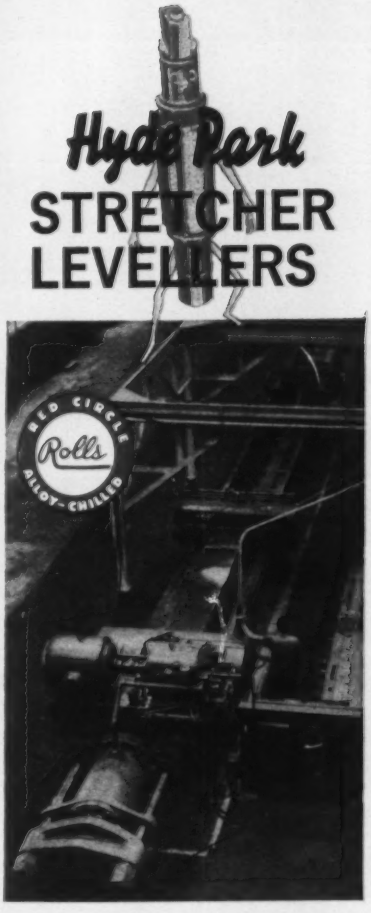


Hyde Park Levellers have a complete range of stretching capacities from 150 to 1250 tons—for levelling ferrous and non-ferrous sheets in sizes up to 120 inches wide by 500 inches long.

Adaptable for automatic cycling.

Pneumatically or hydraulically operated wedge or toggle type jaws.

Hyde Park
FOUNDRY AND MACHINE CO.
HYDE PARK
Westmoreland County, Penna.

Rolls
Rolling Mill Equipment
Gray Iron Castings

HANDY & HARMAN SILVER BRAZING
Permits Manufacturer to Guarantee Underwater Air Regulator For Life

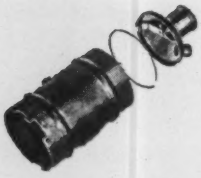
Perhaps the most vital component of a skin diver's equipment, this Viking Air Regulator, manufactured by Christensen Tool & Engineering Company, Norwalk, Connecticut, is structurally guaranteed for life. It must, under all conditions, be absolutely leaktight. The manufacturer's guarantee is a relatively recent achievement—through the high-strength help of silver alloy brazing with Handy & Harman EASY-FLO 45 and HANDY FLUX.

Over and above the unreserved dependability of brazed joints, the brazing method itself has saved the company considerable time, money and material in the production of the Viking Air Regulator. Brazing's simplicity is interestingly illustrated in this case by this company's requirement that assemblers and testers of the Viking must be skin divers themselves.

Almost invariably, silver brazing effects economies and brings advantages to whatever part, product or assembly it is applied. True, air regulators are few and far between, but the point is that they are *metal products, made of a number of different metal components.*

And that's the phrase that covers brazing's great adaptability. To give you a good idea of how you can put brazing to work, we'd like to send you Bulletin 20—it covers the basics of brazing and it may very easily solve your metal-joining problems. Handy & Harman, 82 Fulton Street, New York 38, N. Y.

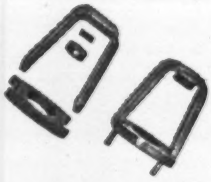
Here, in "serial" form is how the guarantee is "brazed" into the Viking:



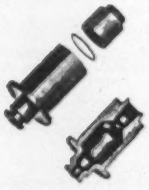
1. TANK HOUSING—Initially, this component was mechanically joined and made "airtight" by means of sealants. Now, brazing eliminates 8 holes, 4 tapping operations, 4 screws and 3 assembly operations.

2. FORK ASSEMBLY—There are five separate brazed joints, done with hand torch and hand-fed wire. Brazing eliminates one tapped hole, a lock washer and a spacer, plus the fact that positive alignment is now guaranteed.

5. Shown here are the finished Viking components before and after assembling. —Brazing by Specialty Brazing Laboratories, Riverside, Connecticut.



3. YOKE—This is assembled from stampings instead of castings, which were previously used. With brazing, no secondary finishing operations are required. Further, the part is stronger and lighter, and savings on material and labor on this component alone add up to 28%.



4. PISTON—This is the most important single element of the Viking. It regulates flow of oxygen from cylinder to mouthpiece; from 300 lbs. pressure to normal breathing. Without brazing, this part could not be made.

Your No. 1 Source of Supply and Authority on Brazing Alloys

HANDY & HARMAN

General Offices: 82 Fulton St., New York 38, N. Y.

DISTRIBUTORS IN PRINCIPAL CITIES

Al Lussier, Group Leader,
Cleaning Department,
Worthington Corporation,
Holyoke, Massachusetts

"We cut abrasive costs two-thirds when we switched to Rotoblast Steel Shot"

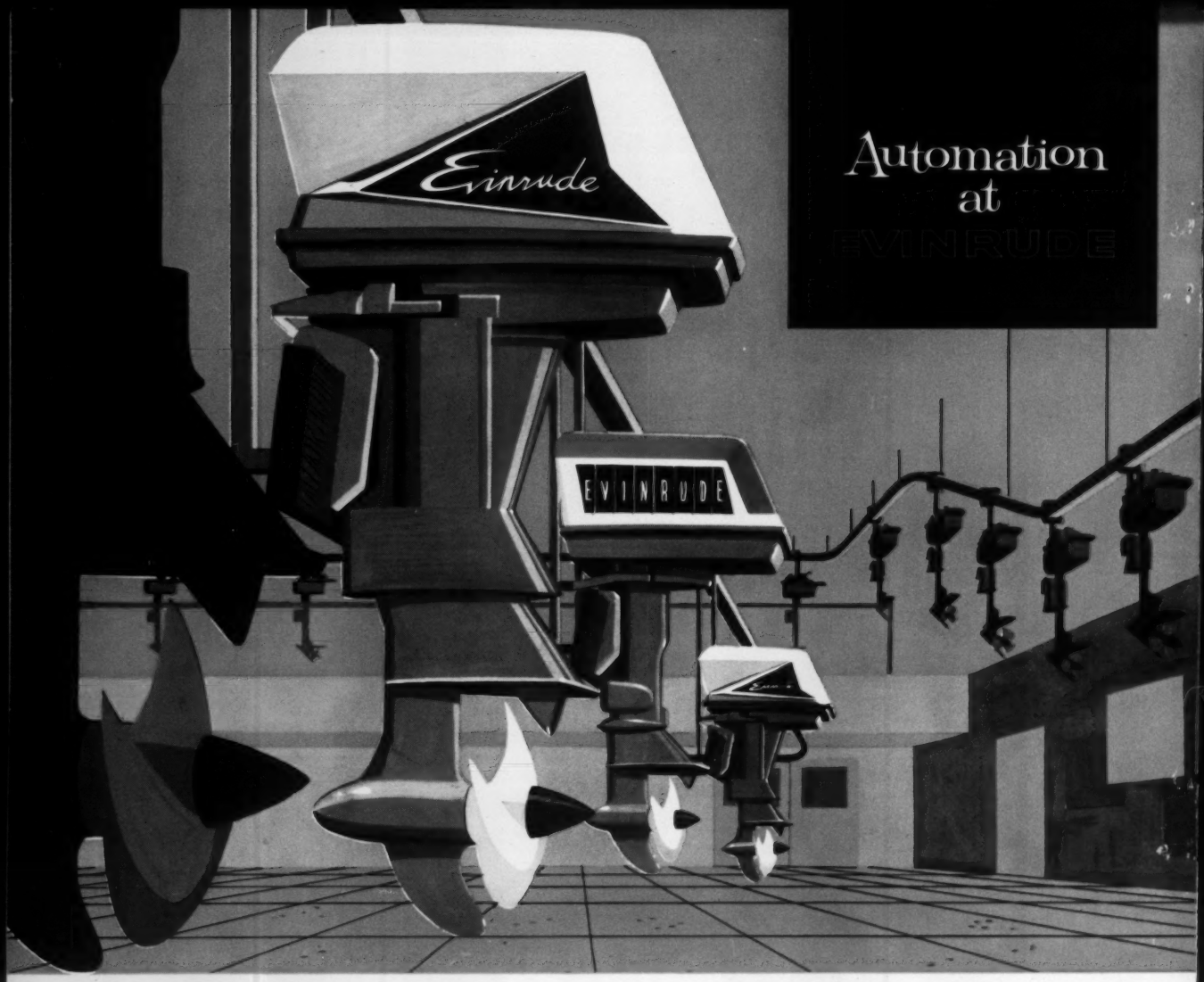
Chilled iron shot had been used previously at Worthington's Holyoke plant. When the switch to Rotoblast Steel Shot was made, not only did abrasive costs drop by two-thirds, but wheel vanes which lasted only 60 hours with chilled iron shot, now last 240 hours!

The Worthington people are fully aware that Rotoblast Steel Shot costs more than chilled iron shot. But they also know their Rotoblast Steel Shot lasted six times as long! In their thinking, it isn't the cost of the abrasive, but the cost of the end result that counts.

You, too, can reduce cleaning costs if you change to Rotoblast Steel Shot.

For complete information write to PANGBORN CORPORATION, 1600 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning, Vibratory, Dust Control Equipment—Rotoblast Steel Shot and Grit.*®

Pangborn ROTOBLAST®
STEEL SHOT AND GRIT



Automation at EVINRUDE

U.S. VARIDYNE system coordinates variable speed, multi-motor conveyors

Problem: Evinrude required coordination of many variable speed motors on unequally loaded long line conveyors. Above, one line carries partially assembled outboard engines of varying weights...on another line, finished engines flow to shipping department.

Solution: U. S. Motors field engineers suggested a U. S. VARIDYNE a/c Drive System which was selected by Evinrude on the basis of reliability and suitability to Evinrude's continuous long line production conveyors. Reliability for continuous production is assured by the use of *standard a.c. motors* throughout. VARIDYNE not only converts these fixed-speed motors to adjustable speeds, but coordinates them as well, because all motors change speeds simultaneously. U. S. VARIDYNE is available in pre-engineered packages for numerous production applications. *Write today for* VARIDYNE *Brochure F-1963.*

U.S. ELECTRICAL MOTORS INC.

P. O. BOX 2058, LOS ANGELES 21, CALIF. OR MILFORD, CONN.

US MOTORS